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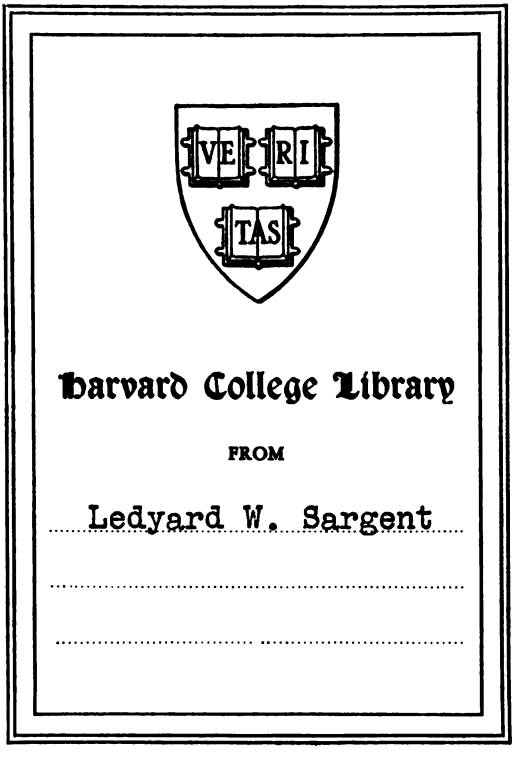

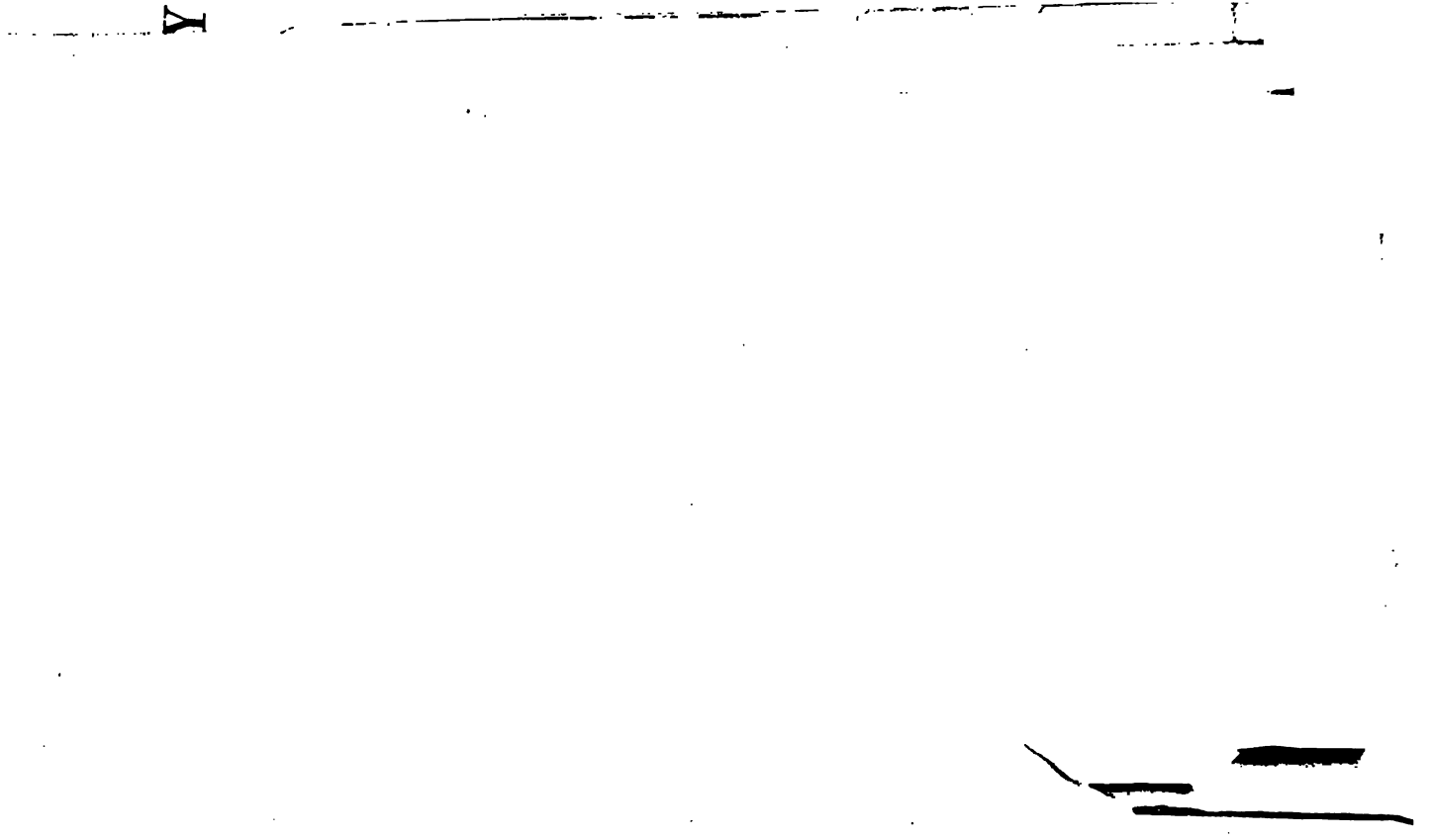

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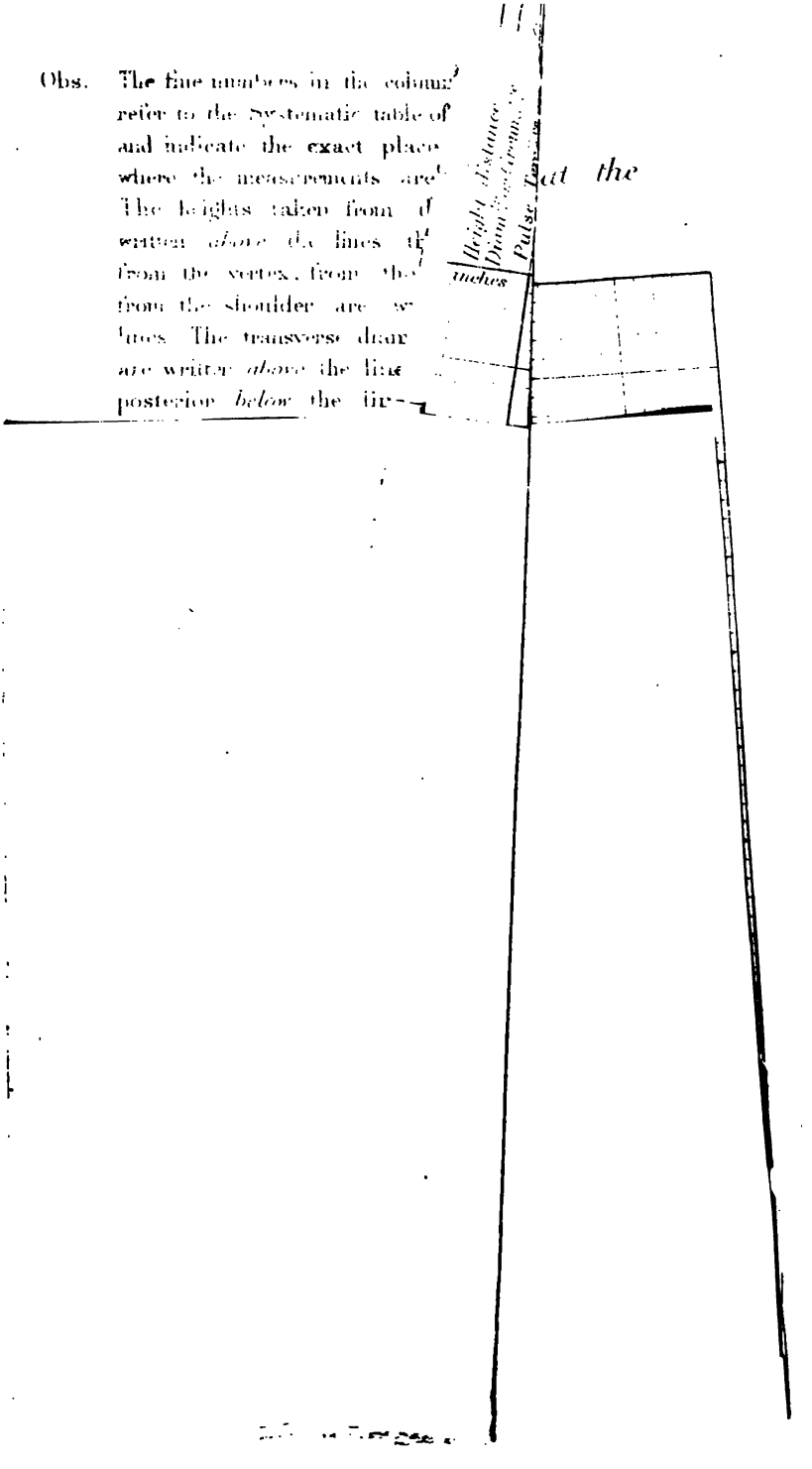

A

MANUAL OF ANTHROPOMETRY

OR

A GUIDE TO THE PHYSICAL EXAMINATION AND MEASUREMENT OF THE HUMAN BODY:

CONTAINING A SYSTEMATIC TABLE OF MEASUREMENTS, AN ANTHROPOMETRICAL CHART OR REGISTER, AND INSTRUCTIONS FOR MAKING MEASUREMENTS ON A UNIFORM PLAN.

ILLUSTRATED BY NUMEROUS DIAGRAMS, CHARTS, AND STATISTICAL TABLES.

By CHARLES ROBERTS, F.R.C.S.

LATE ASSISTANT SURGEON, VICTORIA HOSPITAL FOR CHILDREN;

AUTHOR OF 'THE PHYSICAL DEVELOPMENT AND PROPORTIONS OF THE HUMAN BODY,' 'THE PHYSICAL REQUIREMENTS OF FACTORY CHILDREN.'

LONDON:

J. & A. CHURCHILL, NEW BURLINGTON STREET.

1878.

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'THE indispensable part of the experimental observation of physical facts is *the measurement of quantities.* Galileo knew that all physical objects are *extended*, and consequently, by their nature and essence, measurable, though they may not always be measurable by the methods and instruments we possess;—that all physical phenomena take place in periods susceptible of measure—that physical phenomena must be reducible to movements, some perceptible, others imperceptible, by our senses. As regards all these phenomena, he held that the right method was to measure all that was measurable, and to endeavour to render measurable all that was not already directly so. All who have proceeded *à priori*, from Aristotle to Descartes downwards, have arrived at results the falsity of which suffices to condemn their method.'

Galilée, les Droits de la Science et la Méthode des Sciences Physiques. Par Th. Henri Martin. (Paris, 1868.)

PREFACE.

THIS small book is a portion of an Introduction to a larger work on the *Physical Development and Proportions of the Human Body*, which I have in preparation; hence its fragmentary character. It is published in this form in order, if possible, to incite a wider interest in an important and interesting field of study hitherto much neglected, and to invite the coöperation of those observers who have already devoted some attention to the subject, with a view to establishing a uniform method of making and recording measurements on the external form of man for scientific purposes.

The Systematic Table of Measurements and the Anthropometrical Chart or Register have been constructed after long and careful consideration of the subject, on anatomical, physiological, and practical grounds; and I trust their fitness for the purposes indicated will be generally admitted. Although at first sight the scheme may seem too elaborate for

general use, I think it will be found on examination, that it contains neither more nor less details than are necessary for the proper study of the subject; it admits, moreover, of being used in part or in its entirety, according to the object the student may have in view, and may, therefore, be accepted as a basis to secure uniformity in making and recording observations, and enabling us to compare together, or combine for statistical purposes, the measurements of different observers.

There are other reasons why I am induced to publish the Table of Measurements and the Chart, which were originally drawn up for my own use. I have been engaged for several years in collecting statistics of measurements of various parts of the body of both sexes, and at all ages, for the purpose of investigating the physical development and proportions of the human body. In the course of my inquiries a large number of the registers of gymnasiums, schools, and public institutions, both military and civil, have passed through my hands, and I have frequently had to regret the imperfection of the details which they contained. This imperfection appears to be due, not so much to carelessness on the part of the keeper of the register or indifference

or unwillingness on that of the pupils to submit to examination, but to ignorance of the kind of facts most deserving of record; to the mode of making the examinations; to the absence of the necessary apparatus; and to the want of a convenient form of book in which to enter the measurements when made. I have had occasion, moreover, to enlist the coöperation of numerous friends in my work, and to write out for each of them precise instructions as to the mode of procedure; hence a series of definitions and directions have been laid down, which I have embodied in the following pages.

To the intelligent traveller, and to many officers of the Army and Navy on foreign stations, this *Manual* and Chart will be found useful, and while supplying a new source of study and occupation, will enable them to contribute to the progress of anthropological science. It has been my good fortune to visit many parts of the world, and to see the various branches of the human race in their own lands; and I have constantly felt the want of some convenient form of register in which to enter the physical proportions of the people; and this want was constantly before my mind while the construction of the Chart was under consideration.

The work will, I trust, be found a useful handbook for many persons who are desirous of assisting the Committee of the British Association for the Advancement of Science, engaged at the present time in investigating the physical proportions and the Racial elements of our British population.

The Systematic Table of Measurements and the Anthropometrical Chart have been adapted to each other; but the Chart is so complete and comprehensive in itself that, after a little practice, reference to the table of measurements will be found unnecessary. It is proposed, therefore, to publish the Chart in separate sheets, for private use or for clinical purposes, or bound in volumes as registers for gymnasiums, hospitals, schools, &c. Exceedingly interesting results would accrue to the individual and to Science if parents would adopt a Chart for each of their children, and record from year to year on their birthdays some of the principal proportions of the body. For this purpose one Chart would suffice for eight or sixteen years, or even for a whole lifetime.

Bolton Row, Piccadilly, W., London,
June 1878.

WORKS OF REFERENCE ON ANTHROPOMETRY.

NOTE.—The following list of works of reference, to which I have made many important additions, is taken from Dr. J. H. Baxter's introduction to *Statistics, Medical and Anthropological, of the Provost-Marshal-General's Bureau* of the United States Government. I am indebted to the courtesy of Dr. Baxter for a copy of this interesting Report, which consists of two thick quarto volumes, and contains the records of the medical examinations and measurements of over a million recruits, &c. during the late civil war in the United States of America.

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A

MANUAL OF ANTHROPOMETRY.

INTRODUCTION.

THE objects and advantages of ascertaining the physical proportions of the body, and of the weight and strength of different individuals, are too numerous to receive more than a passing notice here; and I must refer the reader to my published papers, and to numerous foreign works on Anthropometry, for a more complete account of them.*

On the narrow grounds of individual interest it is desirable to ascertain the changes which take place in the conformation of the body under the various

* 'The Physical Development and the Proportions of the Human Body,' *St. George's Hospital Reports*, 1874-6; *The Physical Requirements of Factory Children* (London, 1876). See especially Quetelet's *Anthropométrie, ou Mesure des Différentes Facultés de l'Homme* (Bruxelles, 1870); and Schwarz's *Anthropology: a System of Anthropometrical Investigations as a Means for the Diagnosis of Human Races* (Vienna, 18

modifying influences of age, nurture, occupation, and sanitary surroundings, and to watch the effects of physical training or athletic exercises — whether favouring health or acting injuriously on the system.

It would be very interesting, on social grounds, to find out, by careful examination, the physical proportions of men who have distinguished themselves by performing great feats of strength, speed, or physical endurance, as such information would indicate which members of a community are best fitted for posts, and could safely undertake duties, requiring the exercise of any of these qualities.

It is important to ascertain what are the physical proportions most favourable to general good health and longevity, or which indicate a disposition to peculiar diseases; whether for sanitary purposes, the insurance of lives, or certifying to the fitness of persons for various occupations at home or abroad.

For the diagnosis of many diseases, accidents, and deformities of the body, physicians and surgeons resort to measurement of the external form, which measurements, to be of value to science, should be made and recorded in a uniform manner.

Many important and interesting physiological and pathological questions bearing on the growth and development of the body can only be set at rest by extensive anthropometrical inquiries, carried out by

a large number of observers in different parts of the world; such as the effect of climate on the development of a race—our own, for instance, in England, America, Australia, India, &c.—the effects of the season of the year, of peculiar hygienic conditions, and of diseases of hereditary or accidental character; and it is absolutely necessary that all such observations should be made and recorded in an easily recognised and systematic manner.

From a wider and national point of view it is desirable that we should know the rate of growth of children from year to year, the proportions which exist at different ages, the period at which the body attains maturity, and recognise the nature and peculiar effects of various influences at work in modifying the physical development of our labouring population; to enable us to regulate the employment of children in factories and workshops, to guide us in the selection of recruits for the military and naval services of the country, and to determine, if possible, the much-debated question of the physical degeneracy of a people.

Naturalists have arrived at the conclusion that measurement of the different dimensions of the body constitutes the best means of classifying the various races and varieties of mankind. 'Detailed research more and more justifies Blumenbach's words, that

innumerable varieties of mankind run into one another by insensible degrees. This state of things, due partly to mixture and crossing of races, and partly to independent variations of type, makes the attempt to arrange the whole human species within exact bounded divisions an apparently hopeless task. It does not follow, however, that the attempt to distinguish special races should be given up; for there, at least, exist several definable types, each of which so far prevails in a population as to be taken as its standard. It is by following M. Quetelet's method of defining such types that the subdivisions of mankind into races, so far as it has been done to any purpose, has been carried out by anthropologists.'*

* Dr. E. R. Tylor, in *Ency. Brit.*, 9th edit., article 'Anthropology.'

CHAPTER 1.

METHODS OF STUDYING THE PROPORTIONS OF THE HUMAN BODY.

WHEN we take a superficial view of the human species we find it composed of individuals varying so widely in physical character that it appears almost hopeless to subject it to a methodical and scientific study. On closer examination, however, certain typical forms are found to prevail through all the stages of development round which the irregularities of size and weight group themselves in the most uniform manner.

The proportions of the body have been studied by sculptors and artists from the earliest times of which we have any record, and, as will be seen from the foregoing list of works of reference, numerous books have been written by them on the subject. Indeed, until quite recently, the study has been appropriated by them, and neglected by physiologists and naturalists as one pertaining only to the Fine Arts. Their works are, however, of little scientific value, as we are ignorant for the most part how the proportions were deter- to

a vague idea of the beautiful in the human form or from actual measurements of the living body. M. Quetelet, who has studied these early records with the eye of an artist as well as a scientific inquirer, thus speaks of them: 'I have tried to gain a glimpse of the principal works on the proportions of man by consulting different times and different peoples. I have been astonished, I avow, at the few original documents I have found. Even according to these, the authors employed but few models to fix the size and the beauty of the conformation of the members, and oftenest the proportions of the child were totally wanting. We see, however, from the works of the Greeks alone, who have always remained masters in these matters, the infinite precautions which they took to arrive at their ends, and to unite elegance of proportion to exactitude of form. Imbued with a knowledge of these, they indeed only consulted the stature of man for the assemblage and agreement of the different parts. Phidias, it is said, to arrive at elegance, employed twenty models; he borrowed from each of them the most beautiful parts, his knowledge of the human form permitting him to arrange them with all the necessary strength and dignity.*

It is foreign to my object in this small work to describe the various attempts which have been made

* *Anthropométrie*, p. 412.

to reduce the study of human proportions to exact schemes by the various authors to whom M. Quetelet refers. From the *Silpi Sastri* of the Sanscrit manuscript of India to Mr. Story's disquisition on the mystical qualities of triangles, squares, and circles (1866), the same fallacy pervades them all, namely, a belief that the key to the theory is to be found in the occult relations of numbers or in the parts of a geometrical diagram.*

There is one artist, however, to whom this remark does not apply, namely, our illustrious countryman Sir Joshua Reynolds, who seems to have had a clear conception in his own mind of the true theory of proportions, although it does not appear that he took any pains to establish it by actual measurements.

As science owes to the poetical mind of Goethe the discovery which has so greatly simplified the study of vegetable morphology—that the leaf is the typical form of the plant, and that all the other organs are modifications of the leaf—so she owes to the æsthetic mind of Sir Joshua Reynolds the idea of the existence of a typical form in man, and the order which prevails in the seeming variations from that type. In this, as in so many other matters, Sir

* See Dr. Baxter's Introduction to *Statistics, Medical and Anthropological*, p. lx

Joshua was in advance of his times, and it remained for M. Quetelet to reduce this artistic conception to a scientific generalisation, and to demonstrate its truth and utility by wide and careful observation on living models.

Sir Joshua's views on this subject form the substance of his third discourse, delivered to the students of the Royal Academy of Arts, in 1770, of which he was then President. Although the language in which they are expressed is such as suited his own tone of mind, and was fitted for an audience of art-students, it is sufficiently exact and interesting to deserve the attention of scientific men. 'All the objects which are exhibited to our view by Nature,' says he, 'upon close examination will be found to have their blemishes and defects. The most beautiful forms have something about them like weakness, minuteness, or imperfection. But it is not every eye that perceives these blemishes. It must be an eye long used to the comparison of these forms; and which, by a long habit of observing what any set of objects of the same kind have in common, has acquired the power of discerning what each wants in particular. By this means we acquire a just idea of beautiful forms; we correct Nature by herself, her imperfect state by her more perfect, and make out an abstract idea of forms more perfect than

any one original. . . . From reiterated experience and a close comparison of the objects of Nature, the artist becomes possessed of a central form from which every deviation is deformity. . . . To the principle I have laid down, that the idea of beauty in each species of being is an invariable one, it may be objected that in every particular species there are various central forms, which are separate and distinct from each other, and yet are undoubtedly beautiful; that in the human figure, for instance, the beauty of Hercules is one, of the Gladiator another, of Apollo another; which makes so many different ideas of beauty. It is true, indeed, that these figures are each perfect in their kind; but still none of them is the representation of an individual, but of a class. And as there is one general form which belongs to the human kind at large, so in each of these classes there is one common idea and central form which is the abstract of the various individual forms belonging to that class. Thus, though the forms of childhood and age differ exceedingly, there is a common form in childhood and a common form in age, which is the more perfect as it is more remote from peculiarities. But I must add further, that though the most perfect forms of each of the general divisions of the human figure are ideal, and superior to any individual form of that

class, yet the highest perfection of the human figure is not to be found in any one of them. It is not in Hercules, nor in the Gladiator, nor in the Apollo; but in that form which is taken from them all, and which partakes equally of the activity of the Gladiator, of the delicacy of the Apollo, and the muscular strength of the Hercules. . . . There is, likewise, a kind of symmetry or proportion which may properly be said to belong to deformity. A figure lean or corpulent, tall or short, though deviating from the type, may still have a certain union of the various parts which may contribute to make them on the whole not unpleasing.'

Before proceeding to explain how M. Quetelet has established the truth and utility of these views of the artist, and reduced them to a scientific form, I must notice the method of studying and defining the proportions of man adopted by Professor Carus of Dresden.

This distinguished physiologist, considering the proportions of man as an object of morphology, has tried to find physiological laws to fix what he calls the 'canon,' or, to use an expression familiar to architects in the case of the column, the 'module' of our organisation. For this purpose he supposes a figure, the model of which he had executed by the sculptor Rictochel according to his injunctions, and

after admitting the variations of certain parts pertaining to the sexes, he deduces from it the forms both of man and woman.

'If people are anxious,' says he, 'to find the true key of our proportions, they should start from the vertebral column, which is, so to speak, the real organic ell, divided into 24 inches (free vertebræ).

'When we open the ovum of a mammiferous animal at the commencement of its incubation, we find as the first model of the future animal the germinative disc, intersected in the middle by a line which subsequently becomes the dorsal column or spine. . . . This line becomes longer, and we observe as an already nearly complete model of the future animal a division of this line by the rudiments of the vertebræ. Properly speaking, this form is, then, the first "canon" of every other organisation of the future framework, for according to its method of production and development the whole organisation has to be regulated.

'Now there are extremely interesting relations when we examine the ratios of length of the free vertebral column in the new-born infant and the adult. In the case of the first (that is to say, at the end of fœtal life), it will be found that the length of all the twenty-four free vertebræ corresponds, in

the normal child, very exactly to one-third of the length of the same free vertebral column, of twenty-four vertebræ, measured in the adult, at the period of the cessation of growth, by a perpendicular line from the *processus spinosus atlantis* to the *processus spinosus lumbaris ultimæ.*' This standard, or, as Professor Carus calls it, 'modulus' of a third of the length of the adult spine, he considers to be formed and established on a physiological and philosophical basis, and its application gives the exact mathematical means of the proportions of our organism, exact in the strictest sense of the word, and therefore ideal proportions which can never be entirely realised in human nature. The following are some of the measurements given by Professor Carus: The length of the skull from the forehead to the occiput, and the height of the vertex from the lower margin of the upper jaw, are each equal to one module; the circumference of the head equals three modules. The length of the sternum, the length of the scapula, and the length of the hand are each equal to one module; the arm and forearm are equal to two modules; the thigh two and a half, the leg two, and the foot from the ankle to the tip of the toe one module. The height of the whole body is nine and a half modules. The module for the adult measures eighteen centimètres, or rather more than seven inches. Dr.

Humphry,* who has made measurement of numerous *skeletons* for the purpose of testing the value of this means of determining the scale of the proportions of the figure, found them in a general manner confirmatory of the result obtained by Professor Carus; but the exceptions to the rule were very numerous.

Professor Carus gives the following account of his statuette and the mode of using it: 'No sex has been assigned to this little statue; and it is easy to see that, in order to form a living individuality, the modulus or canon must always be made to vary slightly. For instance, if I wished to depict a woman's body, I should give a little less breadth to the shoulders, and I should make some members rather more voluminous; while I should act exactly the contrary in the case of a man. In the same way the individualities might be varied: if I wished to represent a Cicero or a Leibnitz, I should give to the head more than a module in height and length, and less at the extremities; on the other hand, if I wished to represent an athlete or a giant, I should add to the limbs, and should take ten or more modules as the height of the whole body. By this means one could even succeed in depicting every sort of expression by an algebraical formula, where one would have the

* *On the Human Skeleton.*

same elements, but increased or diminished in their value.'

Thus it appears that Professor Carus uses his 'canon' either as a kind of artist's lay-figure, which he dresses out according to his fancy, or as a skeleton, which he clothes with flesh according to his anatomical and physiological knowledge—knowledge, it must be remembered, which must be first obtained from actual observation and measurement of the living model. The 'canon' may indeed be theoretically correct, but it can be of little practical use for scientific purposes. The greater breadth of shoulders required to convert the statue into the figure of a man must first be determined by actual measurement, as must also the greater breadth of pelvis to convert it into the form of a woman, before we can be satisfied that it represents the natural human form. The difficulty would be still greater if it were attempted to represent any decided variation from the typical form. In the case of a giant, for instance, it is not sufficient to add half a module in equal proportions to the nine and a half modules representing the stature of an ordinary man in order to produce the giant; for actual observation and measurement show that the size of the head and trunk of giants differs little from those of men of ordinary stature, and that the excess of height of the former is chiefly due to

an unusual development of the lower extremities relatively to the rest of the body. Professor Carus's canon, moreover, renders no assistance to the study of the progressive development of the body, as we know that the different parts of the body develop at various rates. Thus, in the young child the middle point is near the navel, but in the adult man it is below the pubes.

M. Quetelet's method of studying the development and proportions of the human body will most strongly recommend itself to the English student, as it is based on the inductive, and not, like Carus's, on the deductive method of investigation, and applies, moreover, to the whole period of the life of man. This distinguished mathematician, like the artist and the physiologist, recognises the existence of a central or typical form in man; but while theirs are ideal forms, his is a real one, and is the *mean* result of a large number of actual measurements of the living body. Hence the 'central form' of Sir J. Reynolds and the 'canon' of typical proportions of Professor Carus become the 'mean man' (*homme moyen*) of M. Quetelet.

'When I first began my studies,' says M. Quetelet,* 'concerning the proportions of the human body, I was dismayed at the extent which this immense

* *Anthropométrie*, p. 13.

field of research presented. In fact, I came to the conclusion that in order to obtain data which were fairly complete, I should have to determine for each individual a considerable number of numerical elements; and I was not as yet certain as to how many individuals I should have to measure in order to discover the characteristic details of any particular age. As it was necessary, moreover, to repeat this labour for both sexes, and to follow, so to speak, step by step, the shades of difference which distinguish each period of existence, I came to the conclusion that the life-long labours of the most patient observer would prove inadequate to the task. . . . . Fortunately, I soon perceived that my fears were exaggerated, and that my labour would be greatly simplified by the discovery of a principle which would serve as a basis for it, and which I think I may consider as the most curious and interesting result at which I have arrived.

'A large number of naturalists and philosophers have attempted to prove, by a course of reasoning which is more or less conclusive, *the unity of the human species*. I believe that I have succeeded in demonstrating, not only that this unity exists, but that our race admits of a type or model the different proportions of which can be easily determined.

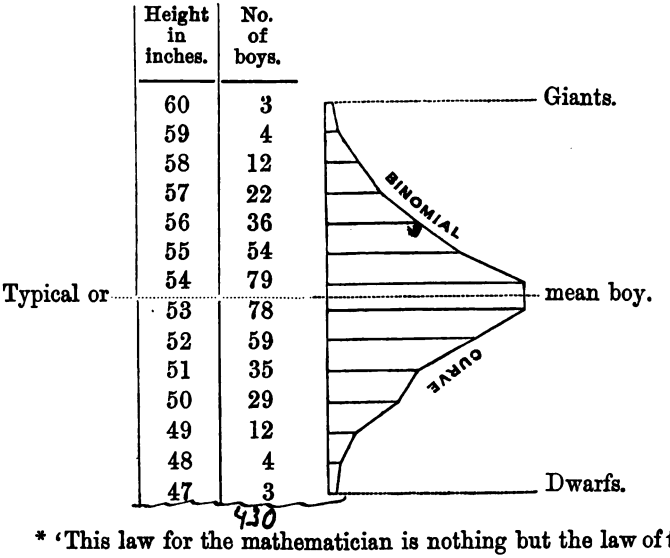
'If there were an absence of type, and if men

were unlike one another, not from the effects of accidental causes, but because no common law really existed among them, they might be measured, as regards height for instance, without all the individual measurements offering any particular character or any definite numerical relation.

'If, on the contrary, all men have to a certain degree been east in the same mould, and if they issue from it with differences which are purely accidental, the groups will no longer be formed in an erratic manner; but their numerical values, in accordance with the theory of probabilities, will be subject to preëstablished laws, so that the numbers which represent each can be determined *à priori*. There exist, therefore, for this entirely special case, characteristics by which we may recognise whether individuals belong to the same type, and only differ owing to fortuitous causes. Another consequence of the theory is, that the greater the number of observations the more do fortuitous causes explain each other, and make the general type, which they at first tend to screen, stand out prominently. Thus, in the human race, when individuals only are considered, all heights are met with, at least within certain limits; those who come nearest the average are the most numerous; those who deviate the most from it form the smallest number; and the groups follow numerically

a law (the binomial law of Newton*) which may be laid down beforehand. In the case of man this law is verified, not only in relation to the entire height, but also as regards his various members; and the same is the case with the weight, or strength, or any quality which can be measured and reduced to numbers.'

The following table and diagram, which represent the heights from actual measurement of 430 English public-school boys of the age from eleven to twelve years, will illustrate Quetelet's views and make them more easily understood:



* 'This law for the mathematician is nothing but the law of the coefficients of the binomial quantity developed, which, for the sake of brevity, we will call *the binomial law.* If, for instance, *four* balls are taken out of an urn which contains a considerable number

It will be seen that the numbers arrange themselves according to a very uniform rule, the most numerous groups are in the middle of the column at 53 and 54 inches; while the groups at 52 and 55 inches are less in number, and those at 51 and 56 inches are still fewer, and so on till the extremely small number of the very short and very tall boys of 47 and 60 inches is reached. It is thus ascertained that the mean or typical boy of the class and age given is 53·5 inches, and as representing the most numerous group he forms the standard from which the other groups of boys decrease in number as they depart further and further from his proportions.

In the diagram, which has been drawn to a scale, the length of the horizontal lines (*abscissæ*) represents the numbers of boys in each group, and the curved line binding the ends together is the well-

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of white balls and exactly the same number of black balls, we shall, if we call a white ball *a* and a black ball *b*, get the following formula as the result of drawing :

$$a^4 + 4a\,^3b + 6a\,^2b^2 + 4a\,b^3 + b^4.$$

The sum of the coefficients of the terms indicates the number of drawings which can take place; *i.e.* a single one produces four white balls, four producing three white balls and one black, six producing two white and two black balls, &c., or in all sixteen possible chances for each drawing. Each of these sixteen drawings given will consequently, according to the laws of probabilities, take place once in sixteen drawings.' *Anthrop.* p. 16.

known 'binomial curve,' or the 'curve of the frequency of error.' Now it will be seen that this curve is not quite uniform, and that the lower half (from the mean to the dwarfs) is less regular than the upper; and if the numbers are counted it will be found that there are ten more boys below the mean than above it, consequently the *average* (obtained in the usual way, by dividing the sum of the values observed by the number of observations) is lower than the *mean*, which is represented by the largest group. The difference in this instance is not very great, the average being 53·43, and the mean 53·5 inches, but in some instances it is much greater; and it is exceedingly important that the difference here indicated should be borne in mind, for in it consists much of the practical value of Quetelet's method.

Dr. Tylor, in the article already referred to, gives a practical illustration of the difference between a mean and an average when employed to separate two races in a mixed population. 'The population of a Californian settlement,' says he, 'made up of whites and Chinese, might show two predominant groups (one of 5 feet 8 inches, the other of 5 feet 4 inches), corresponding to the two racial types. It need hardly be said that this method of determining the mean type of a race, as being that of its really existing and most numerous class, is altogether superior

to the mere calculation of an average, which may actually be represented by comparatively few individuals, and those the exceptional ones. For instance, the average stature of the mixed European and Chinese population just referred to might be 5 feet 6 inches, a worthless and, indeed, misleading result.'

M. Quetelet very properly insists on this difference between an average and a mean, and Sir J. Herschel thus refers to it (*Edin. Rev.* 1850): 'An average may exist of the most different objects; as of the height of houses in a town, or the sizes of books in a library. It may be convenient to convey a general notion of things, but it involves no conception of a natural and recognisable central magnitude, all differences from which ought to be regarded as deviations from a standard. The notion of a mean, on the other hand, does imply such a conception, standing distinguished from an average by this feature, namely, the regular march of the groups, increasing to a maximum, and then again diminishing. An average gives us no assurance that the future will be like the past; a mean may be reckoned on with the most implicit confidence. All the philosophical value of statistical results depends on a due appreciation of its consequences.'

I have dwelt on the importance of recognising

the difference between a mean and an average when applied to the study of the physical proportions of man, because it has been overlooked by writers in this country, and because I propose to use it further on, when treating of the relation between the height and weight of man.

All the published statistics relating to this subject which have come under my notice are simple *averages*, and not *means*. But this must necessarily be the case when a small number of observations is dealt with, as was the case with M. Quetelet, who, after measuring thirty individuals of the same age, divided them into three groups, and finding the groups so nearly alike, concluded that the measurement of ten 'regularly constituted' models would suffice to determine the typical proportions for each age and sex. In this respect my tables show that M. Quetelet was in error, and to this must be attributed the differences which occur between his results and mine. Thus, in the table of the heights of the boys of eleven years of age already given (page 18), we find a variation of fourteen groups of an inch each; that is to say, some of the boys are 13 inches taller than others of the same age; and a much wider difference occurs as the age advances; so that it could be by accident only that ten of the groups could determine the true mean boy: there would not be one boy to represent

each group which might occur in 430 individuals, and the three omitted groups would influence the position of the mean, especially if the mean was a mere mathematical one. The accuracy, therefore, of M. Quetelet's figures depends on his ability to select 'properly constituted' models for measurement; and as such selections might vary with the experience of observers, the results of two or more observers could hardly be identical, or their typical forms or standards the same. If the typical form could be eliminated in this manner, the limits and the grouping of the variations could not, which are matters of equal practical importance. The method which I have adopted of accumulating a large number of measurements for each age is the only one which will meet all these requirements.

The human type is not so fixed and persistent in its characteristics as not to be liable to yield to the influence of constant causes. The Chinese will always be shorter in stature than Europeans, but still the law of accidental causes will not be less constant in its operation; the only result will be that in each race the variations in height, &c., will take place round a greater or smaller mean, and they will in both instances be influenced by climate, food, occupation, &c. These regular oscillations around the same type are observable from the very instant of

birth, only their limits become more confined the nearer we approach that period; as if Nature, acting alone, was loth to deviate from its type, and as if the greatness of the variations arose chiefly from the modifying influences of man.* It is for the purpose of fixing the typical forms of man for each age as they exist *at present* in this country, and for ascertaining the range and nature of the deviations from those forms, and the modifying influences producing the deviations, that my present work is written. It is necessary to bear in mind that the typical form eliminated by this method is not necessarily the most perfect form of man, but represents the equilibrium, as it were, of many contending forces which may be disturbed by the future predominance of any one of them; hence the typical form is not the same for the working and the non-working man, for the man living in towns and the man living in the rural districts. In this way each group above and below the mean is typical of the predominance of some modifying cause,

* It is in man and domesticated animals that the widest range of variation is observed. In wild animals, and especially in birds and insects, the individuals of the same species appear to differ little in size; and the naturalist often relies on the measurements of the length of the body, the wings, &c., as important distinctive marks of varieties. Naturalists are, however, accustomed to speak of 'fine specimens,' which shows that there are important accidental variations from the mean.

if we could but distinguish it. Many of the modifying causes are obscure and very complicated; but others are easily recognised, and are deserving of careful investigation.

While adopting M. Quetelet's method of studying the proportions of the body as the best, and indeed the only, scientific method yet propounded, we cannot accept his tables with equal confidence, as they are based on too small a number of observations; and, moreover, the measurements, being those of Belgians, are not applicable to the inhabitants of this country. In my tables in the eighth volume of the *St. George's Hospital Reports*, I have shown the differences which exist between M. Quetelet's averages and my own, which are based on a much larger number of observations. Professor Bowditch, in his work *On the Growth of Children in America*, has also called attention to an interesting and important fact, which appears to have escaped M. Quetelet's notice, that at the age of 13 and 14 years girls are taller and heavier than boys of the corresponding ages; and I have shown that the same is true in this country. M. Quetelet represents the two sexes as of the same size at 12, but at all other ages the female is smaller than the male. M. Quetelet found the inhabitants of towns taller than those living in rural districts, the reverse of the order which exists in this country.

CHAPTER II.

APPARATUS.

THE apparatus for making measurements of the body and for ascertaining the weight and strength are few in number, and, with the exception of the callipers and the dynamometer, are easily accessible in some of the common forms in use for commercial purposes. But as I am anxious to encourage anthropometry as a systematic study, not only among scientific men and the members of the medical profession, but among the managers of gymnasiums and schools, I shall describe the instruments which I have found most convenient for the purpose, many of which have been constructed according to my instructions.

The unit of measurement is the English inch divided into *tenths* and not *eighths*, as in the ordinary rules in use in this country. The decimal system of notation occupies less space in the chart, is most easily written down, and is best adapted for subsequent arithmetical and statistical manipulation.

On the hand-rule, the measuring-rod, and the measuring-tape which I am accustomed to use, the

metrical and English system of measures are placed in juxtaposition, and both can be read off at the same time with equal facility. This arrangement saves a great deal of troublesome calculation, and helps to familiarise the mind and the eye with the relative values of the two systems, and enables the observer to register his measurements in metrical and English values in parallel columns. Where calculations have to be made to reduce the one system to the other, the following table will be useful:

Measures of length.	In English inches.	In English feet (=12 inches).	In English yards (=3 feet).
Millimètre . . .	0·04	—	—
Centimètre . . .	0·39	0·03	0·01
Décimètre . . .	3·93	0·32	0·10
Mètre	39·37	3·28	1·09

1 inch equals 2·54 centimètres.
1 foot „ 3·04 décimètres.
1 yard „ 0·91 mètres.

N.B. If the measurements be taken in inches and *eighths*, the fractions must be reduced to the decimal form, thus:

Eighths of an inch reduced to tenths.

1	inch	equals	1·00
$\frac{7}{8}$	„	„	0·87
$\frac{3}{4}=\frac{6}{8}$	„	„	0·75
$\frac{5}{8}$	„	„	0·62
$\frac{1}{2}=\frac{4}{8}$	„	„	0·50
$\frac{3}{8}$	„	„	0·37
$\frac{1}{4}=\frac{2}{8}$	„	„	0·25
$\frac{1}{8}$	„	„	0·12

The unit of weight and strength is the English pound avoirdupois (16 ounces). I am not aware of the existence of any English weighing-machines adapted for the use of metrical weights of which the kilogramme=2·2 pounds English would form the unit, as there is at present no demand for them; but if they were required the mechanical difficulty could be easily overcome, and the employment of two sets of weights of different shapes would prevent confusion or mistake. The following table will be useful for reducing the English to the metrical weights:

Measures of weight.	In English ounces, avoird.	In English pounds (=16 ounces), avoird.	In English stones (=14 lbs.), avoird.
Gramme	0·03	—	—
Décagramme . .	0·35	0·02	0·001
Hectogramme .	3·53	0·22	0·015
Kilogramme . .	35·27	2·20	0·157
1 lb. avoird. equals 0·45 kilogrammes.			
1 stone „ „ 6·35 „			

We are indebted to Mr. John Bellows of Gloucester for an admirable contrivance for reducing the English to the metrical, and the metrical to the English system of weights and measures. It consists of a series of circular cards placed one above the other, and diminishing in size from the bottom to the top, the whole of them working on a common centre. Round the margins of the cards are printed the weights or measures of the two systems, and by turn-

ing the cards so as to bring the required values opposite to each other the result can be read off by a simple process of addition. For my own method, see the remarks on the *measuring-staff*.

The *hand-rule* is an ordinary boxwood measure one mètre in length (39·37 inches English), with four joints to allow of its being folded up in one direction. It is graduated into English inches and tenth of inches, and the mètre is subdivided into décimètres, centimètres, and millimètres. The two scales are placed in direct apposition to show their relative values, but are easily distinguished by the difference in the size of the figures employed for marking the two systems. The hand-rule, besides being the standard of reference, has other uses which will be mentioned below.

The *measuring-staff*, for taking the various heights of the body, is a light square rod of lance-wood two mètres in length, with a joint in the middle for convenience of carriage or storing away when not required for use. Its total length is 78·74 inches English, or rather more than 6 feet 6 inches. It is graduated on the face into feet, inches, and tenths of inches; and, to save the trouble of calculation and to prevent mistakes being made, the whole of the inches are marked in succession, from 1 at the bottom to 78 at the top. On one side of the staff the

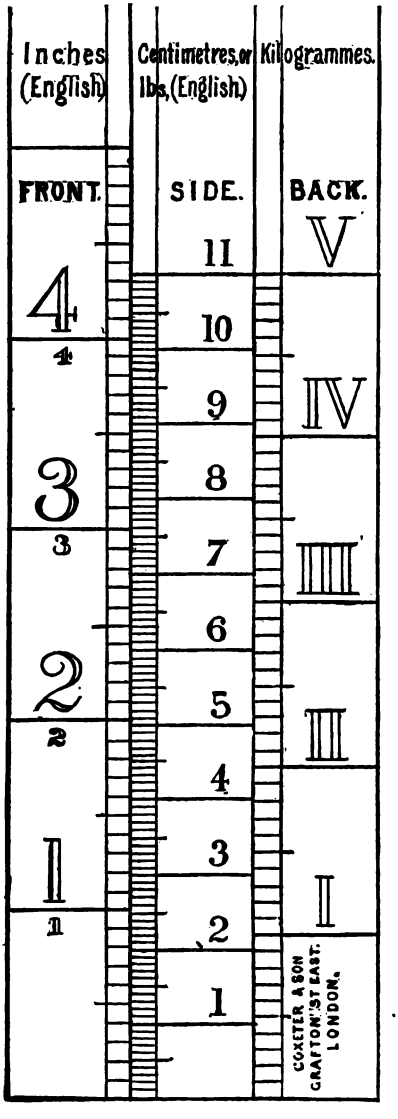


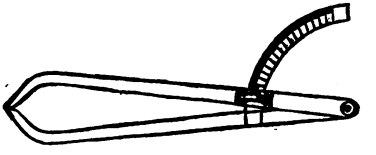
Diagram of a portion of the scales on the front, side, and back of the *measuring-rod*, showing the relative value of English inches and centimètres, and of English pounds avoirdupois and kilogrammes. The two divisions—inches and centimètres—represent a portion of the *hand-rule* actual size.

metrical system is given, the smaller divisions of which meet at the same angle as the smaller divisions of the English measures, to show their relative values. On the back of the rod a scale is given, which, in conjunction with the centimètre scale, is intended to facilitate the conversion of English pounds weight into kilogrammes, or the reverse. For this purpose the 200 centimètres of the length scale are made arbitrarily to represent 200 pounds weight, and the divisions on the back of the rod 91 kilogrammes, the slight fractional difference being disregarded as of no practical importance. A brass loop is made to slide stiffly up and down the rod by means of a spring to facilitate reference to the scales on different surfaces of the rod, and into the loop the hand-rule can be fitted to form the cross-bar when heights are being taken.

The *measuring-tape* should be two mètres in length, and graduated in the same manner as the hand-rule. As the graduations on measuring-tapes are frequently incorrect, and as the marks influence the mind and hand in determining measurements, especially in taking circumferences of soft parts, it is better to dispense with them and use a perfectly plain tape, and read off the distance on the hand-rule. This is absolutely necessary when great accuracy is desired, as the most practised observer cannot

resist the habit of fixing on the larger and the *even* divisions, rather than on the smaller and *odd* divisions of a scale.

The *callipers* which I use are made of boxwood, and are of a pattern sometimes used by artists. They are 15 inches in length, and are available for measuring from a fifth of an inch to 20 or more inches. They are furnished with a light brass arc, carrying a scale of English inches on one side and of centimètres on the other.



Boxwood Callipers, with brass scale of inches (Eng.) and centimètres.

The *weighing-machine* which appears to me the most convenient, accurate, and suitable alike for public institutions and private consulting-rooms, is made by Messrs. Young & Son of Cranbourne-street, and is designed specially for weighing human beings.*

* This is a very old-fashioned machine. In the Conservatoire des Arts et Métiers in Paris there are five worn-out instruments of this kind, all of which are evidently of English manufacture, as the standards are graduated in English feet and inches, and one of them bears the name and address of the maker, Henry Kettle, St. Paul's Churchyard—a name which has disappeared from the *London Directory* of the present day. In the museum catalogue they are entered thus: *R. f.* 46 *Romaine, dite de Sanctorius.* As far as I can judge, the alterations made in the machine by Messrs.

A very good machine, of the ordinary commercial shape, is sold by Mr. Hawksley of Oxford-street,* which has the advantage of being much less expensive than Messrs. Young's instrument. The numerous weighing-machines to be found in railway stations and other public places are sufficiently accurate when the weight is taken in the clothes, but they are too cumbersome and expensive for private use. In Messrs. Young's and Mr. Hawksley's machines the weight is taken in the upright position, and measuring-rods are attached, so that the height also can be taken while the person under examination

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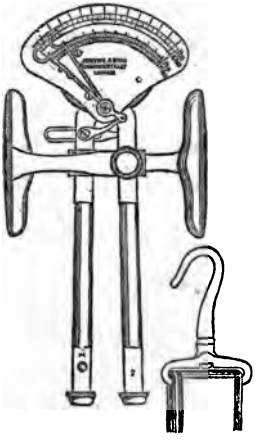
Young add greatly to the expense without increasing its usefulness. The objections to the machine are the use of the old-fashioned scale-pan for the weights instead of the simple beam and suspender adopted in modern weighing-machines, and the demand for additional space made by the pan projecting behind, instead of at the side of, the instrument.

* This machine is approved of by Dr. Fergus of Marlborough College, who used it for taking the weight of the boys; and it was used in the various schools in Boston, U.S.A., and neighbourhood, for ascertaining the weights of about 24,500 children, referred to by Dr. H. P. Bowditch in his work on the growth of children in the United States of America.

is still on the scales, an arrangement which saves much time and trouble when a large number of individuals are being examined.

The dynamometer, to be immediately described, can be used as a weighing-machine, if it is suspended to a beam or trypode by one handle, and a stirrup or bar for the person who is to be weighed be attached to the other. The makers of the dynamometer have fitted it with the necessary appliances for use as a weighing-machine at my suggestion.

A very convenient *dynamometer*, for testing the strength of the hands (grasping), the arms (pulling),



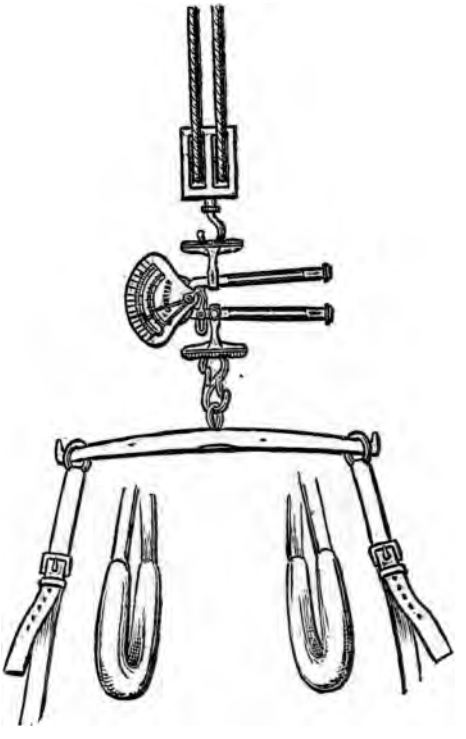
THE DYNAMOMETER.

and the back (lifting), is made by Mr. Coxeter of Grafton-street East, W.C. It consists of a bar of steel coiled on itself in the centre, the ends being left free

and placed parallel to each other, to act as levers. To these levers are attached handles, which can be adjusted according to the test it is proposed to apply. In front of the coil is placed a graduated scale of pounds and kilogrammes, with an index and registering-pointer. The action of the instrument is very simple, and it is available for testing the strength of children as well as adults.*

The callipers, hand-rule, and measuring-tape are important aids to the physician and surgeon for the diagnosis of diseases, accidents, and deformities of the body, and should be found in the wards of every hospital and private consulting-room. I have had my instruments fitted into a light case for the sake of portability, and for preserving them from injury and preventing misplacement or loss. This case I call my 'physical examination case.' The dynamometer, fitted also as a weighing-machine, is packed into a small convenient case; so that the two cases, with a few loose sheets of the anthropometrical chart, form a complete 'outfit' for the anthropometrical student, a substitute for the measuring-rod being easily extemporised.

* This instrument is not adapted, however, for testing the *lifting power with both hands of very strong persons*, as the delicacy necessary for testing the grasping power would be lost in an instrument suitable for that purpose.



The Dynamometer arranged as a Weighing-machine.—Men and boys may be weighed by simply holding the cross-bar with the hands; children and girls by putting the arms through the padded straps, or by reversing the bar and straps, and sitting on the bar as in a swing. The weight of the bar and the straps must be deducted from the total weight, as it cannot be allowed for in the machine without interfering with its use in determining the strength.

CHAPTER III.

THE ANTHROPOMETRICAL CHART.

THIS chart consists of three portions. The first, on the left, contains an outline *diagram* of the human form; the second or central portion, consisting of a series of vertical columns, is the *register;* and the third portion, on the right of the sheet, is the *chart* properly so called. The diagram of the body and the columns of the register are crossed by numerous horizontal lines, which indicate on the diagram the parts of the body to be measured, and on the register the exact place where the measurements are to be written down. The first and second columns of the register contain the names of the parts to be measured, so that the diagram may be dispensed with by persons who are familiar with the anatomy of the external form of the body. To economise space, the heights of various parts of the body from the sole of the foot, and the distances downwards from the vertex, and from the trochanter, are written in the same column of the register, the heights *above* and the distances *below* the horizontal lines corresponding to the parts measured. The transverse and the

antero-posterior diameters of the body are also written in the same column, the former *above* and the latter *below* the lines. The fine hair-line numbers in the columns of the register refer to the *Systematic Table of Measurements* (p. 47), where a description of the proper method of making each measurement is given. These reference numbers are engraved in hair-lines, in order that they may be written upon and obliterated by the actual measurements, as they also mark the exact spot where the entries are to be made. The chart proper is ruled into divisions of inches and tenths of inches, for tracing, by the graphic method, the variations which take place in the size, weight, and strength of the person examined. The scale is indicated by the three columns on the left, one division of the tenth of an inch being equal to one inch in measurements of size, to two pounds in weight, and of five pounds in measurement of strength. The perpendicular lines of the chart represent the dates at which the observations are made, which should be at regular intervals of time: thus, one division of a tenth of an inch should correspond to one day, one week, one month, or one year. Another use of the chart is to lay down a plan or outline diagram of the body, either in front or in profile, from the measurements given in the register, and to make this the starting-point

for marking subsequent variations which may result from growth, training, or disease. (See the Chart-tracings, Nos. 1, 2, 3). Observers who are familiar with the graphic method of treating statistics may dispense altogether with the diagram of the body and the register, and mark on the chart itself the measurements at the time they are made on the body. This remark applies more especially to the recording of clinical observations, and the sheet may be divided in the middle, leaving the column containing the 'General Remarks' attached to the chart.*

It will be understood that, although the diagram represents the figure of a young man, the register and chart are intended for recording the physical proportions of both sexes at all ages, as the parts of the body to be measured are the same in all.† Some of the measurements are of more importance than others; and these are indicated by the horizontal black lines on the diagram, while those of secondary importance are indicated by dotted lines. When the chart is used for special objects of study, the student

* 'Statistical results are now frequently expressed by graphic representations, a certain space drawn to a scale representing a number. The most simple plan is that of intersecting horizontal and vertical lines. . . . Such graphic representations are most useful, and allow the mind to seize more easily than by rows of figures the connection between two conditions and events.' *A Manual of Practical Hygiene*, by E. A. Parkes, M.D., p. 514.

† When used for women or children the figure can be torn off.

may make use of those measurements only which refer to his subject, or substitute others which he may deem more suitable; but it is desirable in all cases where it is possible, to make a thorough examination of each person, and afterwards to record on the chart the variations which are more especially worthy of notice.

THE GENERAL REMARKS refer to the personal identity of the individual examined (name, age, sex, complexion), his nationality or racial origin (Celtic, Teutonic, Scandinavian), the circumstances which surround him and modify his bodily conformation (occupation, nurture, sanitary surroundings), and the results of those modifying influences (imperfect development, deformity, disease).

The *date*, *name*, *sex*, and *age* need no explanations. The complexion or temperament is determined by the *colour of the hair*, which is distinguished as *fair*, *red*, *brown*, *dark brown*, *black;* and by the *colour of the eyes*, which may be described as *light blue*, *dark blue*, *gray*, *brown* (or hazel).

Racial Origin. The terms English, Scotch, Irish, and Welsh very imperfectly express the racial origin and national peculiarities of different portions of inhabitants of the British Isles and their descendants in America and Australia, and should be avoided when the physical conformation and development of

the body are under consideration. The original elements of our British race are becoming so intimately mixed by intermarriage, by easy communication between one part of the country to another, by railways, and by the fluctuations of commercial enterprise, that it becomes every day more and more difficult to distinguish them. But the following table, which indicates the parts of the British Isles which were originally occupied by the Celtic, Teutonic, and Scandinavian races, will in a measure assist the student to distinguish their descendants:

Celtic Races.

Highlands of Scotland.
North and South Wales.
Devon and Cornwall.
West and southern portions of Ireland.

Scandinavian Races.

Shetland.
Eastern Lowlands of Scotland.
Dumfriesshire.
Cumberland.
Westmoreland.
Northumberland.
Durham.
Yorkshire.
Lincolnshire.
Nottinghamshire.
Leicestershire.

Teutonic Races.

The English counties not enumerated in the above lists. The inhabitants of the English counties border-

ing on Wales, and on the north and east coast of Ireland, are a mixture of these races.*

The occupation of an individual, or, if a child, of its parents, explains not only the direct effect of physical or mental work on the constitution of the body, but the kind of nurture and sanitary surroundings to which he may have been subjected. The following classification has been arranged to show all these influences, beginning with the most favoured and ending with the least favoured class of the population of this country. The statistics are taken from the census returns of 1871, and the percentages include the children distributed over all the classes.

Classification of Occupations in England, according to their Social Position and Sanitary Influences.

Upper and Professional Classes.	Class I. (*a*) *Outdoor Occupations.* Persons of Rank. Officers of Army and Navy. Clergymen, Doctors. (*b*) *Indoor Occupations.* Lawyers. Civil Servants. Bankers, Merchants.	328,270	4·46
Commercial Classes.	Class II. *Indoor Occupations.* Clerks. Shopkeepers.	762,014	10·36

* See Dr. Beddoe, 'On the Stature and Bulk of Man in the

Labouring Classes.	Class III. *Selected Occupations.* Soldiers. Policemen. Domestic Servants, &c.	439,377	5·97
	Class IV. *Outdoor Labourers.* Agriculture, Roads, Quarries, Railways, &c.	2,383,799	32·41
	Class V. *Seafaring Occupations.* Sailors. Fishermen, Bargemen.	232,784	3·16
	Class VI. *Underground Occupations.* Miners, Coal and Mineral.	435,558	5·92
Industrial Classes.	Class VII. *Indoor Occupations.* Artisans.	1,971,295	26·82
	Class VIII. *Indoor Occupations.* Factory Operatives. Sedentary Trades, Tailors, &c.	801,536	10·90
	Children of no Occupation. . .	3,704,301	
	Total Male Population.	11,058,954	100·00

The *hereditary diseases* which affect the conformation of the body are scrofula, syphilis, rickets, idiotcy, &c. The *congenital deformities* are the absence or imperfect development of organs, club-foot, supernumerary members, &c.; and the *acquired de-*

British Isles,' *Memoirs of the Anthropological Society of London*, vol. iii. p. 166, 1870.

formities are flat-foot, knock-knee, weak ankles, curvature of the spine, &c. Other circumstances which may influence the development of the body should be recorded, such as exposure to different climates, peculiar modes of living, unusual physical proportions of parents, left-handedness, &c.

NOTE.—Naturalists, travellers, missionaries, and others engaged in anthropometrical inquiries outside the British race and its offshoots will find in the following classification of the races of mankind the principal characteristics deserving of record:

'The different races of mankind are divisable into two primary divisions; the *Ulotrichi*, with crisp or woolly hair, and the *Leiotrichi*, with smooth hair.

'*a.* The colour of the *Ulotrichi* varies from yellow-brown to the darkest hue known among men. The hair and eyes are normally dark, and, with only a few exceptions (among the Andaman Islanders), they are *dolichocephali.* The negroes and bushmen of ultra-Saharal Africa, and the Negritos of the Malay Peninsula and Archipelago, and of the Papuan Islands, are the members of this *Negroid* stock.

'*b.* The *Leiotrichi* are divisible into:

'1. The *Australioid* group, with dark skins, hair, and eyes, wavy black hair, and eminently long prognathous skulls, with well-developed brow ridges, who are found in Australia and in the Dekhan.

'2. The *Mongoloid* group, with, for the most part, yellowish-brown or reddish-brown skins, and dark eyes; the hair being long, black, and straight. Their skulls range between the extremes of dolichocephaly and those of brachycephaly. These are the Mongol, Tibetan, Chinese, Polynesian, Esquimaux, and American races.

'3. The *Xanthochroic* group, with pale skins, blue eyes, and abundant fair hair. Their skulls, like those of the Mongoloid group, range between the extremes of dolichocephaly and brachycephaly. The Slavonians, Teutons, Scandinavians, and the fair Celtic-speaking people are the chief representatives of this division; but they extend into North Africa and Western Asia.

'4. The dark whites, or *Melanochroi;* pale-complexioned people, with dark hair and eyes, and generally long, but sometimes broad, skulls. These are the Iberians and "black Celts" of Western Europe, and the dark-complexioned white people of the shores of the Mediterranean, Western Asia, and Persia.' *The Anatomy of Vertebrated Animals*, by T. H. Huxley, F.R.S., 1874, p. 496.

CHAPTER IV.

A SYSTEMATIC TABLE OF MEASUREMENTS OF THE HUMAN BODY.

Preliminary Remarks.

WHEN we endeavour to describe with accuracy the proportions of the external form of the body, we meet with difficulties in defining the various points from which measurements can be taken. We depend chiefly on the prominent points of the bony framework, and rely as little as possible on the soft parts; a few points of which, however, are sufficiently definite and circumscribed to be available for our purpose, such as the nipples and the navel. Whether we make measurements of the human body or of inanimate things, errors of observation are liable to occur; but it is well known that all such errors are subject to a definite law—the law of the frequency of error—and they can be eliminated by making several measurements, and deducing from them an average which will be the nearest approach to the actual measurement required.

It must be understood that the following measurements refer to the naked body. The heights must be

taken without the shoes, and the diameters and circumferences must be made on the skin itself. Too much importance cannot be attached to this rule, as its non-observance will render the labour worthless and the results misleading, as has been the case with a large amount of the statistics of measurements of the body which have been already published. If, however, the rule cannot be strictly observed, the height of the shoes and the thickness of the dress should be ascertained and deducted from the measurement before it is entered in the register, in order to avoid future error or confusion.*

In recording measurements on the anthropometrical chart, the following instructions must be strictly carried out:

The reference numbers of the Systematic Table of Measurements (to be given immediately) are printed in fine hair-lines in columns 3, 4, 5, 8, and 9 of the register, and indicate the places where the actual measurements are to be written down (*i.e.* the mea-

* The absurdity and false modesty which requires that the whole body, with the exception of the hands and face, should be mysteriously hidden by a mass of tight-fitting clothes, is much to regretted. Children especially ought to have more freedom in this respect, and should be systematically examined without their clothes by competent persons, who can judge of their physical development, and detect at the earliest moment any departure from the normal state.

surements are to be written *upon* the reference numbers).

Measurements of *height*, from the sole of the foot, are to be written *above* the lines corresponding to the parts measured; and *distances* from the vertex, from the acromion and the trochanter, *below* the lines.

Transverse diameters are written *above*, and *antero-posterior diameters* are written *below*, the lines corresponding with the parts measured.

Circumferences are written *above* the lines, and the *breadths* of the hand and foot *below* the lines, corresponding with the parts measured.

All the measurements must be given in English inches and tenths of inches (*i. e.* in decimals), and the weights and strengths in English pounds avoirdupois (16 ounces), unless the metrical system be adopted.

I. Height from the Sole of the Foot (*i. e. from the Ground*).

For taking the heights of various parts of the body from the sole of the foot the person under examination must stand in the upright position without shoes, and the measurements be made with the measuring-staff. It is necessary to observe this rule, as the total height of the body is greater in the recumbent than the upright position. In the case of infants the recumbent position must necessarily be assumed, and

the measurements may then be more easily made with the callipers.

1. Height from the sole of the foot to the perineum or fork.

   For the measurements of the lower limb see Nos. 41, 42, and 43.

2. Height from the sole of the foot to the pubes.
3. Height from the sole of the foot to the abdomen, on a line with the anterior superior spines of the iliac or haunch bones.
4. Height from the sole of the foot to the navel.
5. Height from the sole of the foot to the lower end of the sternum or breast-bone (enciform cartilage).
6. Height from the sole of the foot to the top of the sternum or breast-bone (sterno-clavicular articulation).
7. Height from the sole of the foot to the chin, the head being held in a perfectly horizontal position.
8. Height from the sole of the foot to the vertex (total height).

II. Distances from the Vertex.

The measurements of the face are made by folding the hand-rule to a right angle, and resting one limb on the vertex and the other on the tip of the nose.

The perpendicular distances are read off by noting on the rule where the horizontal lines corresponding to Nos. 9, 10, 11, 12, and 13 intersect it.

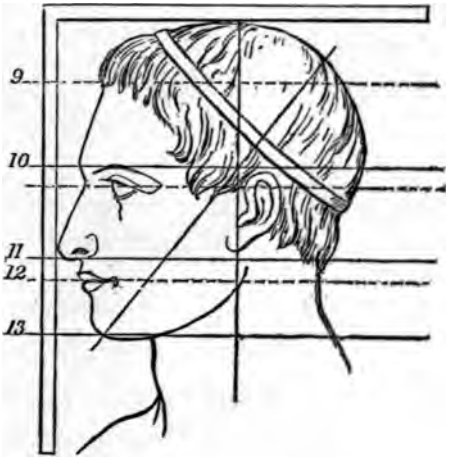


Fig. I.

9. Perpendicular distance from the vertex to the beginning of the growth of the hair on the forehead.
10. Perpendicular distance from the vertex to the frontal sinuses (*i.e.* the eyebrows and the root of the nose).
11. Perpendicular distance from the vertex to the basis of the nose.
12. Perpendicular distance from the vertex to the mouth.
13. Perpendicular distance from the vertex to the point of the chin.

The distances from the vertex to various parts of the trunk need not be enumerated here, as they are between the same parts as the heights already given, but measured in the reverse direction. If they are made, they must be written *below* the lines corresponding to the respective heights and parts measured.

III. Diameters and Circumferences of the Head and Trunk.

All the diameters of the body are measured with callipers, and the circumferences with the measuring or the plain tape; the pressure made when using the instruments should not be so great as to produce indentation of the skin. As the diameters and circumferences of the trunk vary with the state of the respiration, the measurements should be taken when the chest is empty and at rest. This position is most easily secured by making the person under examination count in a loud voice from one to ten, immediately before determining the measurements, the arms being allowed to hang loosely by the sides of the body.

The accompanying diagrams from Kirke's *Handbook of Physiology*, page 208 (after Hutchinson), will convey an idea of the changes which take place in the shape and size of the trunk under the influence of natural and forced respiration. The former is repre-

sented by the thick black lines and the latter by the dotted lines.

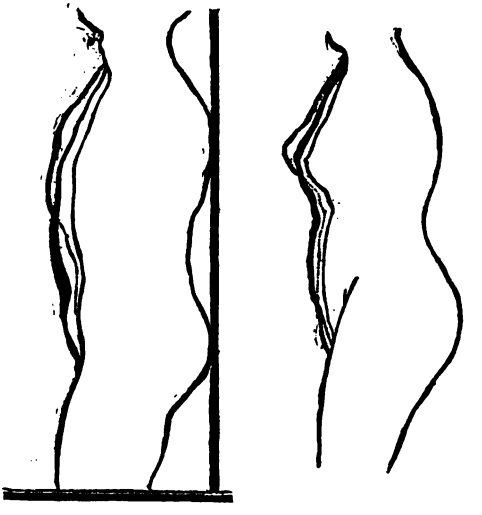


Fig. II.

14. Transverse diameter of the head above the ears on a line with the frontal sinuses. (Fig. I. No. 10.)
15. Antero-posterior diameter of the head from the frontal sinuses to the occipital protuberance. (Fig. I. No. 10.)
16. Circumference of the head on a line with the frontal sinuses (eyebrows). (Fig. I. No. 10.)
17. Transverse diameter of the face below the ears at the articulations of the lower jaw. (Fig. I. No. 11.)

17A. Antero-posterior diameter from the base of the

nose to the back of the neck (spine of first vertebra). (Fig. I. No. 11.)

18. Circumference of face and head on a line with the base of the nose. (Fig. I. No. 11.)
19. Transverse and antero-posterior diameters, and the circumference of the neck on a line with the chin. (Fig. I. No. 13.)
20. The same measurements of the neck at the root of the neck where the clavicles meet.
21. Transverse diameter of the shoulders between the acromion processes.
22. Circumference of the shoulders at the same place.
23. Transverse diameter of the chest at the axillæ. Circumference at the same part (the chest empty).
24. Transverse diameter of the empty chest on a line with the nipples.
25. Antero-posterior diameter of the empty chest on a line with the nipples.

    N.B. The distance between the nipples may be written on the *diagram* between the points measured.

26. Circumference of the empty chest on a line with the nipples.

NOTE. As the principal object of making anthropometrical observations is to ascertain the size of the body and not its fitness for any special functions, the

above measurement is devised for showing the size, and not the breathing capacity, of the chest. The measurement is the one in use in our army and navy for the examination of recruits, and is thus effected: A measuring-tape is placed quite horizontally round the chest, the lower edge of the tape touching the upper part of the nipple and including the lower portions of the scapula behind, the arms hanging loosely by the sides. The recruit is made to count from one to ten to prevent undue inflation of the chest, and the length shown on the tape in inches is the correct chest-girth.

26 +. The difference between the empty and the full chest-girth; to be written opposite the plus (+) sign above No. 26 (expansibility of chest).

27. Transverse antero-posterior diameters and circumference of the empty chest at the lower end of the sternum (breast-bone).

28. Transverse antero-posterior diameters and circumference at the waist.

29. Transverse and antero-posterior diameters at the crest of the pelvis (haunches).

30. Circumference at the same part.

31. Transverse diameter at the trochanters (hip-bones).

31A. Antero-posterior diameter at the pubes.

32. Circumference at the trochanters (the hips).

IV. The Upper and Lower Limbs.

The measurements of the upper limb are made when it is extended horizontally on a line with the shoulder,* and the lower limb either in the upright or recumbent position. The points of departure are, for the upper limb, the acromion prominence of the shoulder, and, for the lower limb, the trochanter. The dotted lines on the right arm and leg of the diagram indicate the direction and the points between which measurements are to be made. Circumferences of muscles, such as the biceps, must not be made immediately after they have been exercised, as they are then unduly distended with blood.

a. *Upper Limb.*

33. Length of the two arms extended horizontally without forced extension, measured from the tip of one middle finger to that of the other.
34. Length of the arm from the acromion (tip of the shoulder) to the external condyle of the humerus at the elbow-joint.
35. Length of the fore-arm from the external condyle of the humerus to the styloid process of the radius at the root of the thumb.

* This position of the arm has not been represented in the anthropometrical chart, on account of the large addition to the size of the chart it would render necessary.

36. Length of the hand from the styloid process of the radius, across the back of the hand, to the metacarpal joint (knuckle) of the middle finger.
37. Length of the middle finger from the knuckle (metacarpal joint) to the tip of the finger.
38. Circumference of the arm at the middle of the biceps muscle.
39. Circumference of the fore-arm at the thickest part.
40. Circumference of the hand at the metacarpal joints (knuckles).
40A. Breadth of the hand at the same part (to be written below the line).

b. *Lower Limb.*

41. Length of the thigh from the trochanter to the lower edge of the patella (knee-cap).
42. Length of the leg from the lower edge of the patella to the internal malleolus (the inner ankle-bone).
43. Length (*height*) of the foot from the internal malleolus (ankle-bone) to the sole of the foot (*i.e.* to the ground).
44. Length of the foot from the heel along the inside of the foot to the top of the metatarsal joint (the ball) of the great toe.

45. Length of the great toe from the top of the metatarsal joint to the tip of the toe.
46. Circumference of the foot at the metatarsal joints.
46A. Breadth of the foot at the same part (to be written below the line).
47. Circumference of the leg above the ankle-joint.
48. Circumference of the leg at the calf of the leg.
49. Circumference of the knee.
50. Circumference of the thigh at the middle.
51. Circumference of the thigh at the fork.

V. Weight of the Body.

The weight of the body should be taken without the clothes. When this is not possible, the *whole of the indoor dress with the shoes should be included*, and the weight of the dress should be recorded separately. Food and exercise will make the weight of the body vary to the extent of two or three pounds, and the weight, therefore, should be taken at the same time of the day. The best time is in the morning before breakfast.

52. Weight of the body in pounds avoirdupois taken without the clothes.
53. Weight of the body in pounds avd. taken in the ordinary indoor dress, including the shoes.

Note. The weight of the clothes may be

written in either of the numbers 52 or 53 left vacant.

VI. Strength of the Body.

In determining the strength by the dynamometer it is advisable to make three trials at intervals of a few minutes and record the average. It is necessary that the instrument should be held or placed in such positions as to prevent the weight of the body interfering with the trials of strength.

a. *Both Arms.*

54. Strength of the arms in antagonism—'pulling'—the instrument being placed in front of the body.
55. Strength of the back—'lifting' with both hands—the instrument being fastened to the ground or by a strap to the feet.

b. *Right Hand.*

56. Strength of the right hand shown by 'grasping' the handles of the instrument together.
57. Strength of the right arm shown by 'pulling,' the instrument being held in front of the body to prevent the weight being thrown in.
58. Strength of the right arm and back shown by 'lifting,' the instrument being in the position of No. 55.

c. *Left Hand.*

59. Strength of the left hand shown by 'grasping:' see No. 56.

60. Strength of the left arm shown by 'pulling:' see No. 57.

61. Strength of the left arm and back shown by 'lifting:' see No. 58.

CHAPTER V.

RELATIVE PROPORTIONS OF THE BODY.

THE measurements described in the foregoing table are to be made *directly*, and show the *absolute* values for each part of the body. But it is also important to ascertain the relative proportions, and the relation which each part bears to the whole. This is done by considering the total height as constant, and equal to 1, or to 100, and calculating what portion of the total height each part of the body forms; and the upper and lower limbs are to be treated in a similar manner. The first, second, sixth, and seventh columns of the Anthropometrical Chart are available for recording these relative proportions of the body, which can be calculated from the *direct* measurements given in the other columns of the register. In representing relative proportions by tracings on the chart the curves will be the reverse of those of the *direct* measurements, and will bend downwards instead of upwards, as shown in the Diagrams II. and III.

Relation of Weight to Height.

In order to ascertain with accuracy the relative weight and height of the human body, it is necessary to determine for each age and in each group of measurements the average weight corresponding to each height. The following table, published by Mr. G. C. Steet,* showing the relation of the weight to the height of a large number of boys at the Telegraph Department of the General Post Office, London, will illustrate this mode of procedure much better than a verbal description. I have added to the table a column of averages of the weights at each height in inches, to show how the weight varies with the age in boys who possess the same stature. I have also altered the arrangement of the table to make it conform with my other tables, but the results have not been interfered with.

* 'The Development and Growth of Boys between Thirteen and Twenty Years,' by G. Carrick Steet, F.R.C.S.,—*St. George's Hospital Reports*, 1874-6, p. 52.

Table showing the Relation of Weight to Height of Boys between the Ages of 13 *and* 20 *Years.*

Height without shoes, in inches.	Number of Telegraph Boys examined. Age at last birthday.							Weight in lbs., without coat, hat, and shoes. Age at last birthday.							Average in lbs.	Height in inches.
	13	14	15	16	17	18	19	13	14	15	16	17	18	19		
71	—	—	—	—	1	1	3	—	—	—	—	149	129	150	142·6	71
70	—	—	1	2	3	4	2	—	—	136	144	147	151	137	143·0	70
69	—	1	3	9	7	5	6	—	129	142	132	138	144	140	139·4	69
68	—	—	6	10	18	11	8	—	—	131	126	131	142	144	134·8	68
67	—	1	7	29	26	12	11	—	123	120	125	132	129	138	128·0	67
66	—	4	8	43	48	27	14	—	119	117	122	126	126	130	123·3	66
65	—	3	26	72	69	21	21	—	107	117	115	120	127	121	118·0	65
64	3	18	37	117	82	28	15	111	112	115	115	116	115	120	115·0	64
63	1	29	57	146	77	24	9	103	108	108	110	115	117	117	111·1	63
62	4	22	66	116	55	12	4	96	101	104	106	109	111	113	105·7	62
61	8	34	76	115	37	3	4	96	98	99	101	106	102	119	103·0	61
60	18	87	81	82	6	2	—	90	93	92	96	101	109	—	97·0	60
59	47	89	85	62	13	1	—	87	89	91	93	93	91	—	90·7	59
58	57	131	46	47	5	—	—	86	86	87	88	94	—	—	88·2	58
57	115	170	48	30	—	—	—	82	83	83	86	—	—	—	83·5	57
56	102	185	35	9	2	—	—	78	80	78	87	81	—	—	80·8	56
55	120	125	18	3	—	2	—	75	76	77	76	—	76	—	76·0	55
54	64	42	5	1	—	—	—	74	74	74	67	—	—	—	72·2	54
53	9	4	—	—	—	—	—	72	69	—	—	—	—	—	70·5	53
52	1	1	—	2	—	—	—	73	70	—	67	—	—	—	70·0	52
51	1	—	—	—	—	—	—	62	—	—	—	—	—	—	62·0	51
Total.	550	946	605	895	449	153	97									

This method of ascertaining the relation of the weight to the height of the body involves a large amount of labour, and has the further disadvantage which results from the employment of *averages* instead of *means* (see post, page 69), inasmuch as exceptional cases influence averages and produce irregularities in the series of results, while means, by disregarding exceptional cases, produce regularity and uniformity in the series.

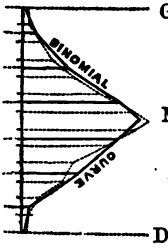
Another method of finding the relation of the weight to the height is to divide the weight in pounds by the height in inches, as I have done in Table IV., in the column headed 'Ratio of height to weight and chest-girth.' This method shows the weight for each inch of stature for each age from 10 to 30 years. A typical boy of 10 years of age weighs 1·252 lbs. for each inch of his height, and one of 23 or 24 years 2·203 lbs. By multiplying these figures by the total height, we obtain the typical weight for their respective ages.

A third method of arriving at the same end is to arrange the heights and weights for each age opposite each other in groups which will bring them within the same limits, as I have done in the following table of the heights and weights of 430 town and country schoolboys, of the age from 11 to 12 years. The statistics were derived from various sources, and

the measurements and weights were taken by several independent observers. The table shows that for each inch in height there is an increase of weight of 3·5 lbs.*

Table showing the Relation of the Heights and the Weights of 430 *Schoolboys between the Age of* 11 *and* 12 *Years.*

	Heights in groups of 2 inches (without shoes).	No. of boys.	Weight in groups of 7 lbs. (including clothes).	No. of boys.	The diagrams are drawn to a scale. The black lines represent the *weights*, and the dotted lines the *heights*.
	60 to 62	3	98 to 105	4	Giants.
	58 „ 60	16	91 „ 98	15	
	56 „ 58	58	84 „ 91	62	
Mean	54 „ 56	133	77 „ 84	133	Mean boy.
	52 „ 54	137	70 „ 77	129	
	50 „ 52	64	63 „ 70	77	
	48 „ 50	16	56 „ 63	10	
	46 „ 48	3	49 „ 56	?	Dwarfs.
		430		430	



This method can also be applied to the average and mean heights and weights for each age, for the purpose of ascertaining their relation to each other; and although the result is not strictly accurate, it is an approximation sufficiently near the truth for all practical purposes. The mean heights

* See the *Physical Requirements of Factory Children* (London, 1876). 'The Growth of Children,' by H. P. Bowditch, M.D., *Eighth Annual Report State Board of Health, Massachusetts* (Boston, U.S., 1877).

and weights corresponding to each age should be arranged in parallel columns, and the weights corresponding to each even inch determined by interpolation. The tracing on Diagram III., showing the relation of the weights to the heights given in Tables I. and II., has been constructed on this plan, and the following figures will show how it was effected:

Age.	Observation.		Interpolation. Weight.	Rate of increase for each even inch of height.	Age.	Observation.		Interpolation. Weight.	Rate of increase for each even inch of height.
	Mean Height.	Mean Weight.				Mean Height.	Mean Weight.		
	inches.	lbs.	lbs.	lbs.		inches.	lbs.	lbs.	lbs.
10	53	67	67			62		103	4
	53·5		69			62·5		105	
	54		71	4		63		107	4
11	54·5	73	73		15	63·5	110	110	
	55		75	4		64		113	6
	55·5		77			64·5		116	
	56		79	4		65		119	6
12	56·5	80	81			65·5		122	
	57		83	4		66		125	6
	57·5		85		16	66·5	126	129	
	58		87	4		67		132	7
13	58·5	88	89			67·5		135	
	59		91	4	17	68	140	140	8
	59·5		93		18	68·5	146	146	
	60		95	4	19	69	148	148	8
	60·5		97		20	69	150	150	
14	61	98	99	4	21	69	152	152	
	61·5		101		25 to 30	69	154	154	6

Thus, for each inch in height the weight is increased 4 lbs. from 10 to 15 years; 6 lbs. from 15 to 16; 8 lbs. from 16 to 19; and from 19 to 30 years of age there is 6 lbs. added to the weight, while the height remains stationary.

CHAPTER VI.

STATISTICAL TABLES.

IN combining into statistical tables the measurements and observations obtained in the manner I have indicated in the foregoing pages, it is of the utmost importance that a uniform plan should be adopted, to admit of ready comparison of the results of different observers. Statistical tables, moreover, should be constructed with a completeness of detail which will preclude the possibility of doubt, or of mistakes being made even by persons imperfectly acquainted with the subjects to which they refer. They should also be diagramatic, in order that the eye may take in at a glance the relation of the facts which they are intended to portray.

I submit the following original tables of the height, weight, and chest-girth of two classes of the English population, as examples of my method of treating anthropometrical statistics. Tables I. to V. inclusive may be accepted as the highest standard of our English race, as the measurements are those of boys and men born and living under the most favourable conditions of breeding, nurture,

occupation, climate, exercise, and sanitary surroundings. They come under the first division of Class I. (persons of rank and *outdoor* professions) of the classified table of occupations given at p. 42, and are derived from the following sources: Public schools — Eton, Marlborough, Wellington, Haileybury, Clifton, Radley, and Magdalen; Britannia Training-ship for Naval Cadets; Woolwich Academy and Sandhurst College for Military Cadets; Oxford and Cambridge Universities; and St. George's Hospital Medical School.*

Tables VI. VII. and VIII. may be accepted as a standard of the physique of the English labouring classes living in large towns, being the measurements of artisans and their children living under unfavourable sanitary conditions and occupations (Class VII. of the classified table of occupations).†

* I am indebted to the following gentlemen for assistance in collecting these statistics: Mr. George Buck, F.R.S.; Mr. Francis Galton, F.R.S., and the members of the Anthropological Institute for reference to manuscript tables in their library; Dr. Fergus of Marlborough College; Surgeon-Major Roberts of Woolwich Academy, and Dr. Fraser of Sandhurst College; Mr. G. R. Turner of St. George's Hospital; Mr. Maclaren of Oxford; Mr. Pessingham of Cambridge; and numerous private friends.

† I am indebted to the following gentlemen for assistance in collecting the materials of which these tables are chiefly composed: Mr. G. C. Steet, Telegraphic Department of the General Post Office; Dr. Crosse, Royal Military Asylum, Chelsea; Dr. F. H.

On examination it will be found that each table consists of three portions, which may be described as *index-columns*, *age-columns*, and *result-columns*. The index-columns are situated on the left and on the right of the tables, and indicate the values observed; that is to say, the heights and circumferences in inches and mètres, and the weights in pounds English and kilogrammes. The age-columns (or time- or date-columns) occupy the centre of the tables, and contain the whole number of observations for each age arranged in uniform groups. The result-columns, situated at the bottom of the tables and continuous with the age-columns, show the total number of observations, the *average* and the *mean* values in inches or pounds, and the variations or rate of growth or increase from year to year.

The total height being the most characteristic and important measurement of the body, the arrangement of the table of heights has been made the model for all the rest. As the height is taken from the ground and increases with the age of the individual till full growth is attained, the table is constructed to read from below upwards, the smaller values being placed at the bottom, and the larger

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Baxter, Royal Hibernian School, Dublin; and Dr. Bridges, Inspector of the Local Government Board, for reference to manuscript returns made by myself and others; and to several private friends.

ones at the top—an order the reverse of that usually adopted in statistical tables referring to other subjects. In this way the table of heights follows the natural order of the development of the body from birth to maturity, and serves as a diagram as well as a record of its development. In order to obtain an adequate idea of the variations in the size of different individuals of the same age, and the limits above and below the average to which those variations extend, the whole number of observations is given;* but as the number of observations for each age is not the same, the whole of them are reduced to a uniform rate *per* thousand, for the purpose of comparing one year with another, and further to increase the diagramatic effect of the table. The averages are worked out from the original measurements, and not from the *per mille* groups. This is especially necessary when the materials are much condensed, as in Table II., where the weights are given in groups of 7 lbs. each.†

* 'Averages are numerical expressions of probabilities; extreme values are expressions of possibilities.' Dr. Guy, in *Cyclopædia of Anatomy and Physiology*, art. 'Statistics.'

† Weights are better arranged in groups of two or four pounds. I was obliged to adopt the groups of seven pounds because some of the statistics of the public-school boys were returned in that form, and I was unwilling to throw them aside on that account. If the weights are taken and recorded in pounds, the statistician can adopt any grouping he may find most convenient.

In Table III. the number of observations of the chest-girth are too few to be reduced to a *per mille* rate, and the original numbers are therefore given.

Averages and Means. It is necessary here to call attention to the difference in the meaning of the terms average and mean—which in common language are synonymous—when used in connection with anthropological inquiries (see p. 20). An *average* is obtained by dividing the sum of the values observed by the number of observations, while a *mean* is the value at which the largest number of observations occur. Thus, the average height of a number of men of different stature is obtained by multiplying the various heights by the number of men at each height and dividing the sum of their heights by the total number of men. The mean height on the other hand is obtained by arranging the men in groups, and noting the height of the group which contains the largest number of individuals. The average height is the measurement which each and all the men would possess if the tall ones could be made shorter and the short ones taller, and the predominance of a few very tall or very short men would determine the relative value of the average height. The mean height is the central or typical height which the men possess, and is the height which all of them ought to be, and probably would be, if their growth had not been inter-

fered with by accidental causes. An average includes, and is influenced by, exceptional cases, while a mean excludes and disregards exceptional cases, and is consequently uninfluenced by them. The distinction has an important practical bearing on the study of anthropology. If we wish to distinguish the specific characteristics of different races of mankind, we employ the mean; if the differences between various classes of the same race, we employ the average. Tables XII. and XIII. show the variations in the height and weight of different classes of our English community as distinguish by averages.

The physical proportions of girls and women have been very imperfectly studied in this country. The only statistics of the height, weight, and chest-girth of females which I have been able to obtain are those of girls between the ages of eight and thirteen years, of the class of artisans, agricultural labourers, and factory operatives.* I have determined, therefore, to give in Tables X. and XI. the statistics of the height and weight of nearly eleven thousand girls between the ages of five and nineteen years, living in the city and neighbourhood of Boston, U.S. America, and published by Professor Bowditch, of Harvard University, in his 'Report on the Growth of Children.'

* These statistics are published in my pamphlet on the *Physical Requirements of Factory Children* (Churchill, 1876).

The tables include all classes of the community, and, therefore, do not correspond with either of the classes of males given in my other tables, but they may be accepted as the mean between the two. The state of society and the school system in America does not allow of the distinction between class and class which is possible in this country. It is probably in our lower middle-class schools (Class II. of the table of occupations) that we must look for the corresponding class of males in this country. I hope that the example of collecting statistics of the physical proportions of females as well as males, adopted in America, will be followed in this country, as it is a matter of great interest and importance.

TABLE I. *Showing the actual, average, and mean* HEIGHT, *and the of* 10 *and* 30 *Years, of the most favoured Classes of the Cadets, Medical and University Students.*

Age last birthday.			10	11	12	13	14	15	16	17
No. of observations.			74	150	248	473	477	541	686	1602
HEIGHT (without shoes). From ft.	in.	From inches.								
6	5	77 to 78	—	—	—	—	—	—	—	—
6	4	76 „ 77	—	—	—	—	—	—	—	1
6	3	75 „ 76	—	—	—	—	—	—	—	2
6	2	74 „ 75	—	—	—	—	—	—	2	2
6	1	73 „ 74	—	—	—	—	—	—	2	5
6	0	72 „ 73	—	—	—	—	—	—	17	25
5	11	71 „ 72	—	—	—	—	—	5	18	72
5	10	70 „ 71	—	—	—	—	—	17	45	98
5	9	69 „ 70	—	—	—	—	8	22	79	124
5	8	68 „ 69	—	—	—	—	12	28	126	158
5	7	67 „ 68	—	—	—	2	14	62	156	150
5	6	66 „ 67	—	—	—	6	41	72	125	139
5	5	65 „ 66	—	—	—	12	58	96	139	95
5	4	64 „ 65	—	—	—	14	52	122	115	64
5	3	63 „ 64	—	—	8	33	83	153	63	42
5	2	62 „ 63	—	—	20	42	100	116	41	14
5	1	61 „ 62	—	—	21	78	129	103	30	5
5	0	60 „ 61	—	13	84	130	125	76	16	2
4	11	59 „ 60	—	13	84	141	136	43	13	1
4	10	58 „ 59	—	60	104	151	81	34	6	—
4	9	57 „ 58	13	76	133	127	67	22	6	—
4	8	56 „ 57	54	140	181	97	29	19	1	1
4	7	55 „ 56	122	186	177	71	27	4	—	—
4	6	54 „ 55	189	220	84	61	18	3	—	—
4	5	53 „ 54	230	100	52	23	8	2	—	—
4	4	52 „ 53	189	93	32	8	8	1	—	—
4	3	51 „ 52	122	40	7	2	4	—	—	—
4	2	50 „ 51	40	46	6	2	—	—	—	—
4	1	49 „ 50	14	13	4	—	—	—	—	—
4	0	48 „ 49	27	—	4	—	—	—	—	—
Total.			1000	1000	1000	1000	1000	1000	1000	1000
Average height.			53·40	54·91	56·97	58·79	61·11	63·47	66·40	67·86
Average growth.			—	1·51	2·06	1·82	2·32	2·36	2·93	1·46
Mean height.			53·00	54·50	56·50	58·50	61·00	63·50	66·50	68·00
Mean growth.			—	1·50	2·00	2·00	2·50	2·50	3·00	1·50
Age last birthday.			10	11	12	13	14	15	16	17

Annual Rate of Growth, of 7709 *Boys and Men between the Ages English Population — Public-School Boys, Naval and Military*

18	19	20	21	22	23	24	25-30	Age last birthday.	
1522	794	391	340	205	91	45	70	No. of observations.	
								HEIGHT (without shoes). Inches.	Average mètres.
1	1	—	—	—	—	—	—	77·5	1·969
1	—	2	—	—	—	—	—	76·5	1·944
2	3	7	—	4	—	—	—	75·5	1·918
4	10	10	12	6	11	—	14	74·5	1·893
19	25	25	33	10	33	22	14	73·5	1·868
34	62	79	50	53	44	44	43	72·5	1·841
73	68	94	89	78	77	111	114	71·5	1·816
124	116	135	165	146	142	133	214	70·5	1·791
136	186	184	133	137	132	134	144	69·5	1·765
167	164	148	148	157	133	267	143	68·5	1·740
142	124	115	142	142	121	133	143	67·5	1·714
122	109	86	133	146	120	67	86	66·5	1·689
69	62	61	59	49	100	45	43	65·5	1·664
54	38	38	24	35	87	44	28	64·5	1·638
39	20	10	9	34	—	—	14	63·5	1·613
7	6	—	3	4	—	—	—	62·5	1·587
4	5	—	—	—	—	—	—	61·5	1·562
1	1	—	—	—	—	—	—	60·5	1·537
1	—	—	—	—	—	—	—	59·5	1·511
—	—	—	—	—	—	—	—	58·5	1·486
—	—	—	—	—	—	—	—	57·5	1·460
—	—	—	—	—	—	—	—	56·5	1·435
—	—	—	—	—	—	—	—	55·5	1·410
—	—	—	—	—	—	—	—	54·5	1·384
—	—	—	—	—	—	—	—	53·5	1·359
—	—	—	—	—	—	—	—	52·5	1·333
—	—	—	—	—	—	—	—	51·5	1·308
—	—	—	—	—	—	—	—	50·5	1·283
—	—	—	—	—	—	—	—	49·5	1·257
—	—	—	—	—	—	—	—	48·5	1·232
1000	1000	1000	1000	1000	1000	1000	1000	Total.	
68·29	68·72	69·13	69·16	68·93	68·52	68·95	69·06	Average height.	
0·43	0·43	0·41	0·03	—	—	—	—	Average growth.	
68·50	68·75	69·00	69·00	69·00	69·00	69·00	69·00	Mean height.	
0·50	0·25	0·25	—	—	—	—	—	Mean growth.	
18	19	20	21	22	23	24	25-30	Age last birthday.	

ABLE II. *Showing the actual, average, and mean* WEIGHT, *and the Annual Rate o the most favoured Classes of the English Population—Public-School Boy*

Age last birthday.	10	11	12	13	14	15	16	17
No. of observations.	74	150	248	473	477	541	686	1602
WEIGHT (including clothes =9 lbs.). Stones. (1=14 lbs.) / lbs. From								
4 to 15	196 to 200	—	—	—	—	—	—	—	—
3 „ 14	182 „ 196	—	—	—	—	—	—	—	4
2½ „ 13	175 „ 182	—	—	—	—	—	—	4	13
2 „ 12½	168 „ 175	—	—	—	—	—	—	5	27
1½ „ 12	161 „ 168	—	—	—	—	—	—	12	48
1 „ 11½	154 „ 161	—	—	—	—	—	6	44	109
0½ „ 11	147 „ 154	—	—	—	—	—	15	63	149
0 „ 10½	140 „ 147	—	—	—	—	—	23	110	170
9½ „ 10	133 „ 140	—	—	—	—	18	59	163	180
9 „ 9½	126 „ 133	—	—	—	—	12	95	174	139
8½ „ 9	119 „ 126	—	—	—	16	29	124	157	85
8 „ 8½	112 „ 119	—	—	—	17	82	122	103	45
7½ „ 8	105 „ 112	—	—	12	43	118	122	76	18
7 „ 7½	98 „ 105	—	—	36	112	247	185	44	10
6½ „ 7	91 „ 98	—	7	79	187	228	140	25	2
6 „ 6½	84 „ 91	—	67	221	256	130	61	9	1
5½ „ 6	77 „ 84	68	155	273	225	41	35	8	—
5 „ 5½	70 „ 77	270	355	233	100	38	8	3	—
4½ „ 5	63 „ 70	446	309	118	38	3	5	—	—
4 „ 4½	56 „ 63	162	100	24	6	—	—	—	—
3½ „ 4	49 „ 56	54	7	4	—	—	—	—	—
Total.		1000	1000	1000	1000	1000	1000	1000	1000
Average weight.		67·44	72·94	80·33	88·60	99·21	110·42	128·34	141·03
Average growth.		—	5·50	7·39	8·27	10·61	11·21	17·92	12·69
Mean weight.		67·0	73·0	80·0	88·0	98·0	110·0	126·0	140·0
Mean growth.		—	6·0	7·0	8·0	10·0	12·0	16·0	14·0
Age last birthday.		10	11	12	13	14	15	16	17

Increase in Weight, of 7709 *Boys and Men, between the Ages of* 10 *and* 30 *Years, of Naval and Military Cadets, and Medical and University Students.*

18	19	20	21	22	23	24	25-30	Age last birthday.	
1522	794	391	340	205	91	45	70	No. of observations.	
								WEIGHT (including clothes = 9 lbs.). Average lbs.	Average kilos.
2	1	—	6	—	—	21	14	203·0	92·27
8	6	5	12	10	—	—	15	189·0	85·91
29	34	64	45	44	75	22	119	178·5	82·04
43	53	51	84	69	75	65	90	171·5	77·95
81	94	138	147	157	118	57	134	164·5	74·77
123	130	162	155	221	172	152	135	157·5	71·59
169	197	216	180	133	205	196	164	150·5	68·41
195	192	182	143	154	151	196	149	143·5	65·22
149	150	108	129	118	54	152	90	136·5	62·05
104	98	49	75	55	108	44	45	129·5	57·83
62	30	20	18	25	32	—	15	122·5	55·68
31	12	5	6	14	10	63	30	115·5	52·50
3	3	—	—	—	—	—	—	108·5	49·31
1	—	—	—	—	—	—	—	101·5	46·13
—	—	—	—	—	—	—	—	94·5	42·95
—	—	—	—	—	—	—	—	87·5	39·78
—	—	—	—	—	—	—	—	80·5	37·50
—	—	—	—	—	—	—	—	73·5	33·41
—	—	—	—	—	—	—	—	66·5	30·23
—	—	—	—	—	—	—	—	59·5	27·04
—	—	—	—	—	—	—	—	52·5	23·86
1000	1000	1000	1000	1000	1000	1000	1000	Total.	
146·00	148·20	152·07	152·34	154·78	151·70	149·20	155·20	Average weight.	
4·97	2·20	3·87	0·27	2·44	—	—	0·42	Average growth.	
146·0	148·0	150·0	152·0	—	—	—	154·0	Mean weight.	
6·0	2·0	2·0	2·0	—	—	—	2·0	Mean growth.	
18	19	20	21	22	23	24	25-30	Age last birthday.	

TABLE III. *Showing the actual, average, and mean Empty* CHEST-GIRTH, *and Annual Rate of Increase, of* 5915 *Boys and Men, between the Ages of* 12 *and* 30 *Years, of the most favoured Classes of the English Population—Public-School Boys, Naval and Military Cadets, Medical and University Students.*

Empty CHEST-GIRTH. Inches. From	Average.	Age last birthday. 10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25-30	Empty CHEST-GIRTH. Average mètres.
42 to 43	42·5	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	1·079
41 „ 42	41·5	—	—	—	—	—	—	—	1	1	2	1	—	—	—	1	2	1·054
40 „ 41	40·5	—	—	—	—	—	—	—	2	1	4	5	4	1	2	1	1	1·028
39 „ 40	39·5	—	—	—	—	—	—	—	9	17	6	7	4	9	5	—	4	1·003
38 „ 39	38·5	—	—	—	—	—	—	4	29	44	24	13	17	11	5	2	3	0·978
37 „ 38	37·5	—	—	—	—	—	—	9	64	93	36	39	33	22	11	6	6	0·952
36 „ 37	36·5	—	—	—	—	—	—	19	142	128	79	58	66	32	12	7	14	0·927
35 „ 36	35·5	—	—	—	—	1	3	27	192	224	144	71	64	28	19	7	14	0·902
34 „ 35	34·5	—	—	—	—	2	6	66	282	296	202	100	68	51	10	9	11	0·876
33 „ 34	33·5	—	—	—	—	4	15	92	298	282	150	64	44	28	9	8	4	0·851
32 „ 33	32·5	—	—	—	—	4	16	70	275	194	98	32	32	16	8	3	4	0·826
31 „ 32	31·5	—	—	—	5	19	35	56	143	106	52	13	11	7	3	2	2	0·800
30 „ 31	30·5	—	—	3	18	21	42	38	54	39	10	3	3	2	3	—	1	0·775
29 „ 30	29·5	—	4	15	39	37	23	11	16	8	4	2	—	—	—	—	—	0·749
28 „ 29	28·5	3	4	23	50	31	24	10	5	—	—	—	—	—	—	—	—	0·724
27 „ 28	27·5	—	4	23	50	18	10	2	2	—	—	—	—	—	—	—	—	0·698
26 „ 27	26·5	—	2	9	16	4	2	—	—	—	—	—	—	—	—	—	—	0·673
25 „ 26	25·5	—	—	4	2	—	—	—	—	—	—	—	—	—	—	—	—	0·648
24 „ 25	24·5	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	0·623
Total.		3	14	77	181	141	176	404	1513	1433	811	408	347	207	87	46	67	**Total.**
Average Chest-girth.		—	—	27·54	28·41	29·65	30·72	33·08	33·98	34·44	34·77	35·25	35·42	35·30	35·50	36·10	35·96	**Average.**
Average increase.		—	—	—	0·87	1·24	1·07	2·36	0·90	0·46	0·33	0·48	0·17	—	0·08	0·60	—	**Average growth.**
Mean Chest-girth.		—	—	27·5	28·5	29·5	31·0	33·0	34·0	34·5	34·75	35·00	35·25	35·5	35·75	36·0	36·0	**Mean.**
Mean increase.		—	—	—	1·0	1·0	1·5	2·0	1·0	0·5	0·25	0·25	0·25	0·25	0·25	0·25	—	**Mean growth.**
Age last birthday.		10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25-30	**Age last birthday.**

TABLE IV. *Summary of Tables I. II. and III. Showing the average and mean Height, Weight, and Chest-girth, and the Annual Rate of Increase, from the Age of* 10 *to* 30 *Years; the Ratio of the Weight and Chest-girth to the Height (the weight or chest-girth for each inch of stature); and the Ratio of Increase (lbs. per inch and chest-girth per inch of growth in height)—Public-School Boys, Naval and Military Cadets, Medical and University Students.*

Age last birthday.	Height (without shoes).				Weight, including clothes=9 lbs.				Empty Chest-girth.				Ratio, Height=1.		Increase, Height=1.	
	Average.	Growth.	Mean.	Growth.	Average.	Growth.	Mean.	Growth.	Average.	Growth.	Mean.	Growth.	Weight.	Chest-girth.	Weight.	Chest-girth.
	Inches.	Inches.	Inches.	Inches.	Lbs.	Lbs.	Lbs.	Lbs.	Inches.	Inches.	Inches.	Inches.	Lbs.	Inches.	Lbs.	Inches.
10	53·40	—	53·00	—	67·4	—	67·0	—	—	—	—	—	1·252	—	—	—
11	54·91	1·51	54·50	1·50	72·9	5·50	73·0	6·0	—	—	—	—	1·339	—	4·0	—
12	56·97	2·06	56·50	2·00	80·3	7·39	80·0	7·0	27·54	—	27·50	—	1·416	0·486	3·5	—
13	58·79	1·82	58·50	2·00	88·6	8·27	88·0	8·0	28·41	0·87	28·50	1·00	1·504	0·487	4·0	0·50
14	61·11	2·32	61·00	2·50	99·2	10·61	98·0	10·0	29·65	1·24	29·50	1·00	1·606	0·488	4·0	0·40
15	63·47	2·36	63·50	2·50	110·4	11·21	110·0	12·0	30·72	1·07	31·00	1·50	1·732	0·488	4·8	0·60
16	66·40	2·93	66·50	3·00	128·3	17·92	126·0	16·0	33·08	2·36	33·00	2·00	1·894	0·496	5·3	0·66
17	67·84	1·46	68·00	1·50	141·0	12·69	140·0	14·0	33·98	0·90	34·00	1·00	2·057	0·500	9·3	0·80
18	68·29	0·43	68·50	0·50	146·0	4·97	146·0	6·0	34·44	0·46	34·50	0·50	2·102	0·503	12·0	1·00
19	68·72	0·43	68·75	0·25	148·3	2·20	148·0	2·0	34·77	0·33	34·75	0·25	2·152	0·505	8·0	1·00
20	69·13	0·41	69·00	0·25	152·0	3·87	150·0	2·0	35·25	0·48	35·00	0·25	2·176	0·507	8·0	1·00
21	69·16	0·03	—	—	152·3	0·27	152·0	2·0	35·42	0·17	35·25	0·25	2·203	0·510	2·0	—
22	68·93	—	—	—	154·7	2·44	—	—	35·30	—	35·50	0·25	2·203	0·514	—	—
23	68·53	—	—	—	151·7	—	—	—	35·52	0·08	35·75	0·25	2·203	0·518	—	—
24	68·95	—	—	—	149·2	—	—	—	36·10	0·60	36·00	0·25	2·203	0·521	—	—
25-30	69·06	—	69·00	—	155·2	0·42	154·0	2·0	35·96	—	36·00	—	2·231	0·521	2·0	2·0

TABLE V. *Table IV. reduced to Metrical Measures and Weights (mètres are reduced to centimètres by removing the decimal point two figures to the right).*

Age last birth-day.	Height (without shoes).				Weight, including clothes=4·1.				Empty Chest-girth.				Ratio, Height=1.		Increase, Height=1.	
	Average.	Growth.	Mean.	Growth.	Average.	Growth.	Mean.	Growth.	Average.	Growth.	Mean.	Growth.	Weight.	Chest-girth.	Weight.	Chest-girth.
	Mètres.	Mètres.	Mètres.	Mètres.	Kilos.	Kilos.	Kilos.	Kilos.	Mètres.	Mètres.	Mètres.	Mètres.	Kilos.	Mètres.		
10	1·357	—	1·347	—	30·64	—	30·45	—	—	—	—	—	22·60	—	—	—
11	1·395	0·038	1·385	0·038	33·14	2·50	33·20	2·73	—	—	—	—	23·97	—	7·19	—
12	1·448	0·051	1·436	0·051	36·50	3·36	36·36	3·18	0·699	—	0·698	—	25·34	0·486	6·23	—
13	1·495	0·046	1·487	0·051	40·27	3·76	40·00	3·64	0·722	0·022	0·724	0·025	26·90	0·487	7·14	·005
14	1·553	0·059	1·550	0·063	45·09	4·82	44·54	4·54	0·753	0·031	0·750	0·025	28·73	0·488	7·20	·004
15	1·613	0·060	1·614	0·063	50·18	5·09	50·00	5·45	0·781	0·027	0·787	0·038	30·98	0·488	8·65	·006
16	1·687	0·074	1·690	0·076	58·31	8·14	57·27	7·27	0·840	0·060	0·838	0·051	33·89	0·496	9·56	·006
17	1·724	0·037	1·728	0·038	64·09	5·77	63·64	6·36	0·863	0·023	0·864	0·025	36·33	0·500	16·73	·007
18	1·735	0·011	1·741	0·012	66·36	2·26	66·36	2·73	0·875	0·012	0·876	0·012	38·11	0·503	22·75	·010
19	1·747	0·011	1·748	0·006	67·40	1·00	67·27	0·90	0·883	0·008	0·883	0·007	38·48	0·505	15·00	·010
20	1·757	0·010	1·754	0·006	69·09	1·76	68·18	0·91	0·895	0·012	0·889	0·006	38·87	0·507	15·17	·010
21	1·758	0·003	1·754	—	69·23	0·12	69·09	0·91	0·900	0·004	0·895	0·007	39·33	0·510	·91	—
22	1·752	—	1·754	—	70·32	1·11	—	—	0·897	—	0·902	0·006	—	0·514	—	—
23	1·741	—	1·754	—	69·00	—	—	—	0·902	0·002	0·908	0·007	—	0·518	—	—
24	1·752	—	1·754	—	68·00	—	—	—	0·917	0·015	0·915	0·006	—	0·521	—	—
25-30	1·754	—	1·754	—	70·54	0·19	70·00	0·91	0·913	—	0·915	—	39·91	0·521	·91	—

The following statistics of the height (*length*), weight, and chest-girth of new-born infants of the artisan class are given in a separate table, as their addition to Tables VI. VII. and VIII. would make them too large for the pages on which they are printed; the measurements, moreover, are not quite identical with those of older children. The heights are taken in the recumbent position, the weights without clothes, and the chest-girths without regard to the state of the respiration. The table includes only infants born at the full period of gestation.*

Table showing the HEIGHT, WEIGHT, *and* CHEST-GIRTH *of New-born Infants of the Artisan Class.*

Height.			Weight.			Chest-girth.		
Inches. From	Males.	Females	Lbs. From	Males.	Females	Inches. From	Males.	Females
23 to 24	1	1	11 to 12	1	—	15·0	1	—
22 „ 23	1	—	10 „ 11	—	1	14·5	1	—
21 „ 22	9	4	9 „ 10	6	2	14·0	4	3
20 „ 21	16	9	8 „ 9	31	20	13·5	4	3
19 „ 20	30	25	7 „ 8	29	36	13·0	6	5
18 „ 19	33	50	6 „ 7	27	29	12·5	1	1
17 „ 18	7	10	5 „ 6	4	11	12·0	2	5
16 „ 17	2	1	4 „ 5	1	1	11·5	—	2
15 „ 16	1	—	3 „ 4	1	—	11·0	1	—
—	—	—	—	—	—	10·5	—	—
—	—	—	—	—	—	10·0	—	1
Total.	100	100	Total.	100	100	Total.	20	20
Average.	19·34	18·98	Average.	7·55	7·23	Average.	13·25	12·65
Mean.	19·00	18·50	Mean.	7·50	7·00	Mean.	—	—

* I am indebted to Dr. J. Cumming of Edinburgh and Messrs. B. W. Large and A. R. Hutchinson, House Surgeons of the Royal Maternity Hospital of that city, for these statistics. The proportions of the new-born infant necessarily form the starting-point for the study of the development of the body; and it is much to be regretted that with the many opportunities which our public institutions present, so few measurements are recorded. M. Quetelet's observations were collected at 'l'Hospice de la Maternité, sur des enfants morts, mais venus à terme et régulièrement conformés,' and as the dimensions of the dead body (still-born ?) they must differ much from those of the living model.

TABLE VI. *Showing the actual, average, and mean* HEIGHT, *and the Annual the Population in large Eng-*

HEIGHT (without shoes).		Age last birthday.										
		4	5	6	7	8	9	10	11	12	13	14
No. of observations.		21	175	327	781	1036	1182	1119	1080	620	991	2247
From ft. in.	From inches.											
6 0	72 to 73	—	—	—	—	—	—	—	—	—	—	—
5 11	71 „ 72	—	—	—	—	—	—	—	—	—	—	—
5 10	70 „ 71	—	—	—	—	—	—	—	—	—	—	—
5 9	69 „ 70	—	—	—	—	—	—	—	—	—	—	1
5 8	68 „ 69	—	—	—	—	—	—	—	—	—	—	—
5 7	67 „ 68	—	—	—	—	—	—	—	—	—	—	1
5 6	66 „ 67	—	—	—	—	—	—	—	—	—	—	2
5 5	65 „ 66	—	—	—	—	—	—	—	—	—	—	5
5 4	64 „ 65	—	—	—	—	—	—	—	—	—	3	12
5 3	63 „ 64	—	—	—	—	—	—	—	—	—	1	23
5 2	62 „ 63	—	—	—	—	—	—	—	—	—	8	20
5 1	61 „ 62	—	—	—	—	—	—	—	—	1	9	41
5 0	60 „ 61	—	—	—	—	—	—	—	1	3	23	79
4 11	59 „ 60	—	—	—	—	—	1	—	2	8	60	100
4 10	58 „ 59	—	—	—	—	—	—	2	2	20	78	130
4 9	57 „ 58	—	—	—	—	—	1	2	11	23	147	169
4 8	56 „ 57	—	—	—	—	—	2	4	22	47	163	176
4 7	55 „ 56	—	—	—	—	—	3	15	46	86	181	124
4 6	54 „ 55	—	—	—	—	—	15	41	75	130	137	63
4 5	53 „ 54	—	—	—	—	2	31	71	112	150	80	34
4 4	52 „ 53	—	—	—	—	3	64	125	149	170	45	11
4 3	51 „ 52	—	—	—	—	24	92	153	149	149	26	7
4 2	50 „ 51	—	—	—	2	44	160	168	157	109	27	2
4 1	49 „ 50	—	—	3	14	105	156	151	117	53	8	—
4 0	48 „ 49	—	—	6	45	135	174	123	78	36	2	—
3 11	47 „ 48	—	—	15	86	184	136	82	60	10	1	—
3 10	46 „ 47	—	—	57	164	188	96	35	8	5	1	—
3 9	45 „ 46	—	11	77	181	146	43	18	9	1	—	—
3 8	44 „ 45	—	40	153	221	94	15	2	—	—	—	—
3 7	43 „ 44	—	97	208	135	44	7	4	1	1	—	—
3 6	42 „ 43	—	137	213	97	19	—	2	1	—	—	—
3 5	41 „ 42	—	275	171	41	7	2	—	—	—	—	—
3 4	40 „ 41	3	183	55	12	4	2	—	—	—	—	—
3 3	39 „ 40	5	165	30	—	1	—	—	—	—	—	—
3 2	38 „ 39	7	57	6	1	—	—	—	—	—	—	—
3 1	37 „ 38	1	29	6	1	—	—	—	—	—	—	—
3 0	36 „ 37	4	—	—	—	—	—	—	—	—	—	—
2 11	35 „ 36	1	6	—	—	—	—	—	—	—	—	—
Total.		21	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Average height.		38·45	41·16	43·18	45·01	46·99	49·22	50·52	51·52	52·99	55·93	57·76
Average growth.		—	2·71	2·02	1·83	1·98	2·23	1·30	1·00	1·47	2·94	1·83
Mean height.		38·5	41·0	43·0	45·0	47·0	49·0	50·5	51·5	53·0	55·5	58·0
an growth.		—	2·5	2·0	2·0	2·0	2·0	1·5	1·0	1·5	2·5	2·5
last birthday.		4	5	6	7	8	9	10	11	12	13	14

Rate of Growth, of 13,931 *Boys and Men between the Ages of* 4 *and* 50 *Years, of lish Towns—Artisan Class.*

Age last birthday.											Height (without shoes).	
15	16	17	18	19	20	21-22	23 to 30	23 to 50.				
745	1018	453	153	97	69	91	135	156	1117	318	No. of obs.	
											Average Inches.	Metres.
—	—	—	—	—	—	—	7	6	—	—	72·5	1·841
—	—	2	6	31	14	44	7	7	—	—	71·5	1·816
1	3	6	33	21	29	33	52	45	—	—	70·5	1·791
5	11	16	33	62	44	44	97	89	—	—	69·5	1·765
8	19	40	72	82	116	77	148	160	—	—	68·5	1·740
12	39	62	80	113	174	121	126	128	—	—	67·5	1·715
14	62	106	184	144	246	308	163	161	—	—	66·5	1·689
36	88	155	139	216	116	197	156	154	—	—	65·5	1·664
55	137	182	184	155	87	99	163	160	—	—	64·5	1·638
90	154	170	157	93	73	55	22	26	—	—	63·5	1·613
95	130	122	72	42	101	22	30	32	—	—	62·5	1·587
126	117	81	20	41	—	—	29	26	—	—	61·5	1·562
118	81	15	13	—	—	—	—	6	—	—	60·5	1·537
134	63	28	6	—	—	—	—	—	—	—	59·5	1·511
89	49	11	—	—	—	—	—	—	—	—	58·5	1·486
91	33	—	—	—	—	—	—	—	—	—	57·5	1·460
66	10	4	—	—	—	—	—	—	—	—	56·5	1·435
39	3	—	2	—	—	—	—	—	—	—	55·5	1·410
13	1	—	—	—	—	—	—	—	—	—	54·5	1·384
5	—	—	—	—	—	—	—	—	—	—	53·5	1·359
3	2	—	—	—	—	—	—	—	—	—	52·5	1·333
—	—	—	—	—	—	—	—	—	—	—	51·5	1·308
—	—	—	—	—	—	—	—	—	—	—	50·5	1·283
—	—	—	—	—	—	—	—	—	—	—	49·5	1·257
—	—	—	—	—	—	—	—	—	—	—	48·5	1·232
—	—	—	—	—	—	—	—	—	Danson (Liverpool Gaol).	Dr. Beddoe (London).	47·5	1·206
—	—	—	—	—	—	—	—	—			46·5	1·181
—	—	—	—	—	—	—	—	—			45·5	1·156
—	—	—	—	—	—	—	—	—			44·5	1·130
—	—	—	—	—	—	—	—	—			43·5	1·105
—	—	—	—	—	—	—	—	—			42·5	1·079
—	—	—	—	—	—	—	—	—			41·5	1·054
—	—	—	—	—	—	—	—	—			40·5	1·028
—	—	—	—	—	—	—	—	—			39·5	1·003
—	—	—	—	—	—	—	—	—			38·5	0·978
—	—	—	—	—	—	—	—	—			37·5	0·952
—	—	—	—	—	—	—	—	—			36·5	0·927
—	—	—	—	—	—	—	—	—			35·5	0·902
1000	1000	1000	1000	1000	1000	1000	1000	—	1117	318	Total.	
60·58	62·93	64·45	65·47	66·02	66·31	66·60	66·68	66·65	66·39	66·72	Av. height.	
2·82	2·35	1·52	1·02	0·55	0·29	0·29	0·08	—	—	—	Av. growth.	
60·5	63·0	64·5	65·5	66·0	66·25	66·5	—	66·5	—	—	Mean height	
2·5	2·5	1·5	1·0	0·5	0·25	0·25	—	—	—	—	„ grov	
15	16	17	18	19	20	21-22	23-30	23 to 50			Age l. bi	

TABLE VII. *Showing the actual, average, and mean* WEIGHT, *and the Annual*
the Population in large

WEIGHT (including clothes).		Age last birthday.									
		4	5	6	7	8	9	10	11	12	13
No. of observations.		21	176	327	631	1038	1203	1126	979	615	1054
Stones (14 lbs.).	Lbs. From										
13 to 14	182 to 196	—	—	—	—	—	—	—	—	—	—
12½ „ 13	175 „ 182	—	—	—	—	—	—	—	—	—	—
12 „ 12½	168 „ 175	—	—	—	—	—	—	—	—	—	—
11½ „ 12	161 „ 168	—	—	—	—	—	—	—	—	—	—
11 „ 11½	154 „ 161	—	—	—	—	—	—	—	—	—	—
10½ „ 11	147 „ 154	—	—	—	—	—	—	—	—	—	—
10 „ 10½	140 „ 147	—	—	—	—	—	—	—	—	—	—
9½ „ 10	133 „ 140	—	—	—	—	—	—	—	—	—	—
9 „ 9½	126 „ 133	—	—	—	—	—	—	—	—	—	—
8½ „ 9	119 „ 126	—	—	—	—	—	—	—	—	—	—
8 „ 8½	112 „ 119	—	—	—	—	—	—	—	—	—	3
7½ „ 8	105 „ 112	—	—	—	—	—	—	—	—	—	4
7 „ 7½	98 „ 105	—	—	—	—	—	—	—	1	5	20
6½ „ 7	91 „ 98	—	—	—	—	—	—	1	6	31	52
6 „ 6½	84 „ 91	—	—	—	—	—	1	12	41	84	171
5½ „ 6	77 „ 84	—	—	—	—	1	23	64	135	267	280
5 „ 5½	70 „ 77	—	—	—	6	32	106	206	304	312	304
4½ „ 5	63 „ 70	—	6	24	144	216	253	386	262	228	120
4 „ 4½	56 „ 63	—	108	355	419	451	335	268	201	68	40
3½ „ 4	49 „ 56	1	534	477	332	236	160	59	48	5	6
3 „ 3½	42 „ 49	9	239	126	97	62	22	4	2	—	—
2½ „ 3	35 „ 42	8	102	18	2	2	—	—	—	—	—
2 „ 2½	28 „ 35	3	11	—	—	—	—	—	—	—	—
Total.		21	1000	1000	1000	1000	1000	1000	1000	1000	1000
Average weight.		41·16	49·99	54·19	56·89	59·00	62·56	66·31	69·46	73·68	78·27
Average increase.		—	8·83	4·20	2·70	2·11	3·56	3·75	3·15	4·22	4·59
Mean weight.		44·0	50·0	54·0	57·0	59·0	62·0	66·0	70·0	74 0	78 0
Mean increase.		—	6·0	4·0	3·0	2·0	3·0	4·0	4·0	4·0	4·0
Age last birthday.		4	5	6	7	8	9	10	11	12	13

Rate of Increase of Boys and Men, between the Ages of 4 and 50 Years, of English Towns—Artisan Class.

Age last birthday.										WEIGHT (including clothes).	
14	15	16	17	18	19	20	21-22	23 to 30	23 to 50		
2094	910	1038	504	147	105	68	93	121	142	No. of observations.	
										Average lbs.	Average kilos.
—	—	—	—	—	—	—	—	8	7	189·5	85·91
—	—	—	—	6	9	—	—	8	14	178·5	82·04
—	—	—	—	—	—	—	32	33	35	171·5	77·95
—	—	—	—	13	—	—	32	42	49	164·5	74·77
—	—	1	6	15	19	15	65	99	106	157·5	71·59
—	—	1	10	27	57	73	32	58	71	150·5	68·41
—	5	8	30	48	124	132	183	198	190	143·5	65·22
—	6	36	47	75	153	177	161	182	162	136·5	62·05
2	19	77	135	251	200	294	269	165	162	129·5	57·83
4	35	123	159	170	124	132	86	116	106	122·5	55·68
15	85	175	278	224	219	118	118	75	70	115·5	52·50
34	123	160	137	75	76	44	22	8	14	108·5	49·31
59	155	185	125	61	19	15	—	8	7	101·5	46·13
106	188	107	41	14	—	—	—	—	7	94·5	42·95
250	204	101	24	8	—	—	—	—	—	87·5	39·78
288	113	19	6	7	—	—	—	—	—	80·5	37·50
186	58	6	2	6	—	—	—	—	—	73·5	33·41
48	9	1	—	—	—	—	—	—	—	66·5	30·23
6	—	—	—	—	—	—	—	—	—	59·5	27·04
2	—	—	—	—	—	—	—	—	—	52·5	23·86
—	—	—	—	—	—	—	—	—	—	45·5	20·68
—	—	—	—	—	—	—	—	—	—	38·5	17·50
—	—	—	—	—	—	—	—	—	—	31·5	14·32
1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	Total.	
84·61	96·79	108·7	116·4	123·3	128·4	130·6	135·4	139·0	141·2	Average weight.	
6·34	12·18	11·93	7·66	6·97	5·08	2·20	4·81	3·58	5·74	Average increase.	
84·0	94·0	106·0	116·0	122·0	128·0	132·0	136·0	138·0	140·0	Mean weight.	
6·0	10·0	12·0	10·0	6·0	6·0	4·0	4·0	2·0	4·0	Mean increase.	
14	15	16	17	18	19	20	21-22	23-30	23-50	Age last birthday.	

TABLE VIII. *Showing the* CHEST-GIRTH

Empty CHEST-GIRTH.		Age last birthday.								
		5	6	7	8	9	10	11	12	13
No. of observations.		128	287	728	874	824	783	840	426	660
Inches. From	Average inches.									
37 to 38	37·5	—	—	—	—	—	—	—	—	—
36 „ 37	36·5	—	—	—	—	—	—	—	—	—
35 „ 36	35·5	—	—	—	—	—	—	—	—	—
34 „ 35	34·5	—	—	—	—	—	—	—	—	—
33 „ 34	33·5	—	—	—	—	—	—	—	—	—
32 „ 33	32·5	—	—	—	—	—	—	—	—	—
31 „ 32	31·5	—	—	—	—	—	—	—	—	—
30 „ 31	30·5	—	—	—	—	—	—	—	—	1
29 „ 30	29·5	—	—	—	—	—	—	1	2	5
28 „ 29	28·5	—	—	—	—	—	1	12	2	11
27 „ 28	27·5	—	—	—	—	5	24	42	21	64
26 „ 27	26·5	—	—	—	3	40	75	108	80	171
25 „ 26	25·5	—	—	22	54	129	177	195	207	303
24 „ 25	24·5	—	10	80	177	269	242	258	312	303
23 „ 24	23·5	31	80	242	301	268	211	242	254	121
22 „ 23	22·5	227	258	332	258	211	203	126	111	20
21 „ 22	21·5	391	415	236	176	73	66	13	9	1
20 „ 21	20·5	320	213	82	30	5	1	3	2	—
19 „ 20	19·5	31	24	6	1	—	—	—	—	—
Total.		1000	1000	1000	1000	1000	1000	1000	1000	1000
Average Chest-girth.		21·40	21·68	22·54	23·09	23·79	24·08	24·34	24·93	25·24
Average increase.		—	0·28	0·86	0·55	0·70	0·29	0·46	0·39	0·31
Mean Chest-girth.		21·0	21·5	22·0	22·5	23·0	23·5	24·0	24·5	25·0
Mean increase.		—	0·5	0·5	0·5	0·5	0·5	0·5	0·5	0·5
Age last birthday.		5	6	7	8	9	10	11	12	13

of English Town Population—Artisan Class.

Age last birthday.										Empty CHEST-GIRTH.
14	15	16	17	18	19	20	21 to 22	23 to 30	23 to 50	
1133	514	643	376	168	90	46	45	88	105	No. of observations.
										Average mètres.
—	—	—	—	—	—	—	—	—	10	0·952
—	—	—	—	—	—	—	—	23	19	0·927
—	—	—	—	—	11	—	22	45	48	0·902
—	—	9	—	6	—	21	67	91	114	0·876
—	2	12	2	30	12	22	111	170	171	0·851
1	10	23	40	77	178	152	178	273	257	0·826
2	19	67	83	131	211	261	222	193	172	0·800
7	76	165	213	267	198	348	245	148	133	0·775
36	84	208	309	261	222	109	133	23	38	0·749
92	185	212	167	156	145	44	23	34	38	0·724
183	193	170	131	42	12	22	—	—	—	0·698
246	243	98	32	24	11	21	—	—	—	0·673
223	124	31	21	6	—	—	—	—	—	0·648
136	50	5	2	—	—	—	—	—	—	0·623
64	14	—	—	—	—	—	—	—	—	0·617
9	—	—	—	—	—	—	—	—	—	0·571
1	—	—	—	—	—	—	—	—	—	0·546
—	—	—	—	—	—	—	—	—	—	0·521
—	—	—	—	—	—	—	—	—	—	0·495
1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	Total.
26·28	27·51	28·97	29·38	30·07	30·56	30·86	31·61	32·38	32·62	Av. Chest-girth.
1·04	1·23	1·46	0·41	0·69	0·49	0·30	0·75	0·77	0·24	Average increase.
26·0	27·0	28·5	29·5	30·0	30·5	31·0	31·5	32·0	32·5	Mean Chest-girth.
1·0	1·0	1·5	1·0	0·5	0·5	0·5	0·5	0·5	0·5	Mean increase.
14	15	16	17	18	19	20	21-22	23-30	23-50	Age last birthday.

TABLE IX. *Summary of Tables VI. VII. and VIII. Showing the Height, Weight, and Chest-girth of English Town Population—Artisan Class.*

Age last birth-day.	Height without shoes.				Weight incl. clothes=7 and 10 lbs.				Empty Chest-girth.				Ratio, Height=1.		Increase, Height=1.	
	Average. inches.	Growth. inches.	Mean. inches.	Growth. inches.	Average. lbs.	Growth. lbs.	Mean. lbs.	Growth. lbs.	Average. inches.	Growth. inches.	Mean. inches.	Growth. inches.	Weight.	Chest-girth.	Weight.	Chest-girth.
Birth.	19·34		19·00		7·55		7·50		13·25		—	—	0·395	0·697	—	—
—	—	19·11	—	19·50	—	33·61	—	36·0	—	8·15	—	—	—	—	—	—
—	—		—		—		—		—		—	—	—	—	—	—
4	38·45		38·50		41·16		44·0		—		—	—	1·143	—	—	—
5	41·16	2·71	41·00	2·50	49·99	8·83	50·0	6·0	21·40		21·0	—	1·220	0·512	2·40	—
6	43·18	2·02	43·00	2·00	54·19	4·20	54·0	4·0	21·68	0·28	21·5	0·5	1·255	0·500	2·00	0·25
7	45·01	1·83	45·00	2·00	56·89	2·70	57·0	3·0	22·54	0·86	22·0	0·5	1·266	0·488	1·50	0·25
8	46·99	1·98	47·00	2·00	59·00	2·11	59·0	2·0	23·09	0·55	22·5	0·5	1·255	0·482	1·00	0·25
9	49·22	2·23	49·00	2·00	62·56	3·56	62·0	3·0	23·79	0·70	23·0	0·5	1·265	0·469	1·50	0·25
10	50·52	1·30	50·50	1·50	66 31	3·75	66·0	4·0	24·08	0·29	23·5	0·5	1·307	0·402	2·66	0·33
11	51·52	1·00	51·50	1·00	69·46	3·15	70·0	4·0	24·34	0·46	24·0	0·5	1·359	0·466	4·00	0·50
12	52·99	1·47	53·50	1·50	73·68	4·22	74·0	4·0	24·93	0·39	24·5	0·5	1·383	0·460	2·66	0·33
13	55·93	2·94	55·50	2·50	78·27	4·59	78·0	4·0	25·24	0·31	25·0	0·5	1·405	0·450	1·60	0·20
14	57·76	1·83	58·00	2·50	84·61	6·34	84·0	6·0	26·28	1·04	26·0	1·0	1·448	0·448	2·40	0·40
15	60·58	2·82	60·50	2·50	96·79	12·18	94·0	10·0	27·51	1·23	27·0	1·0	1·553	0·446	4·00	0·40
16	62·93	2·35	63·00	2·50	108·7	11·93	106·0	12·0	28·97	1·46	28·5	1·5	1·682	0·452	4·80	0·60
17	64·45	1·52	64·50	1·50	116·4	7·66	116·0	10·0	29·38	0·41	29·5	1·0	1·798	0·452	6·66	0·66
18	65·47	1·02	65·50	1·00	123·3	6·97	122·0	6·0	30·07	0·69	30·0	0·5	1·879	0·535	6·00	0·50
19	66·02	0·55	66·00	0·50	128·4	5·08	128·0	6·0	30·56	0·49	30·5	0·5	1·940	0·460	12·00	1·00
20	66·31	0·29	66·25	0·25	130·6	2·20	132·0	4·0	30·87	0·30	31·0	0·5	1·992	0·467	16·00	2·00
21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	66·60	0·29	66·50	0·25	135·4	4·81	136·0	4·0	30·61	0·75	31·5	0·5	2·045	0·473	16·00	2·00
23-30	66·68	0·08	66·50	—	139·0	3·58	138·0	2·0	32·38	0·77	32·0	0·5	2·075	0·481	2·00	—
23-50	66·65	—	66·50	—	141·2	5·74	140·0	4·0	32·62	0·24	32·5	0·5	2·105	0·490	4·00	1·00
Danson.	66·39	—	—	—	143·7	—	—	—	—	—	—	—	—	—	—	—
Beddoe.	66·72	0·07	—	—	137·7	—	—	—	—	—	—	—	—	—	—	—

The following tables of the heights and weights of girls living in Boston, U.S.A., and neighbourhood, include 3681 of American, 3623 of Irish, 585 of German, and 1397 of mixed English, Irish, and American parentage. The results of Dr. Bowditch's analysis of the racial elements is, that the children of American-born parents (and this is true of both sexes) are taller and heavier than those of foreign origin. This superiority in size he attributes partly to difference of race and climate, and partly to the greater comfort and better nurture of the older residents of Boston compared with that of the poorer immigrants from Europe. He makes no note of the Scotch element, which must be largely represented in Boston, as it is in most American towns, whether in Canada or the United States, and which in both height and weight exceeds both the English and the Irish at home.*

* Professor Bowditch has, at my suggestion, tabulated his statistics in the manner I am now advocating (a plan which I first adopted in my paper on Factory Children in the *Jour. Statist. Soc.* 1876); hence the facility with which they can be compared with my own. His printer has, however, omitted a portion of the *index-columns* as unnecessary, and supplied the place of the absent figures by dashes. The consequence is that the two indexes do not agree, and the children gain or lose an inch in height and four pounds in weight according to the use we make of the right or left hand columns in reading the tables. The indexes on the left are obviously the correct ones, and I have adopted them in the following tables; but the error is one which might lead to much confusion, and Dr. Bowditch will be glad to have it pointed out, as I am also glad to quote it to confirm what I have already insisted on, namely, the absolute necessity of making statistical tables complete in every detail, so that no doubt or mistake can arise in reading them.

TABLE X. *Showing the actual, average, and mean* HEIGHT, *America, between the Ages of* 5 *and* 19 *Years.* '*The of the City Proper* (*Boston, U.S.A.*), *in several Schools in Miss Hubbard's School for Young Ladies, and in of Children,*' *by H. P. Bowditch, M.D.; Eighth Annual*

HEIGHT (without shoes).		Age last birthday.						
		5	6	7	8	9	10	11
No. of observations.		605	987	1199	1299	1149	1089	936
From ft. in.	From inches.							
5 9	69 to 70	—	—	—	—	—	—	—
5 8	68 „ 69	—	—	—	—	—	—	—
5 7	67 „ 68	—	—	—	—	—	—	—
5 6	66 „ 67	—	—	—	—	—	—	—
5 5	65 „ 66	—	—	—	—	—	—	—
5 4	64 „ 65	—	—	—	—	—	—	—
5 3	63 „ 64	—	—	—	—	—	—	1
5 2	62 „ 63	—	—	—	—	—	—	2
5 1	61 „ 62	—	—	—	—	—	—	1
5 0	60 „ 61	—	—	—	—	—	—	3
4 11	59 „ 60	—	—	—	—	—	1	15
4 10	58 „ 59	—	—	—	1	—	4	26
4 9	57 „ 58	—	—	—	1	1	9	54
4 8	56 „ 57	—	—	—	—	2	24	71
4 7	55 „ 56	—	—	—	1	7	34	112
4 6	54 „ 55	—	—	—	—	17	65	137
4 5	53 „ 54	—	—	—	6	26	105	133
4 4	52 „ 53	—	—	2	14	69	163	169
4 3	51 „ 52	—	—	3	42	114	174	117
4 2	50 „ 51	—	3	10	78	170	163	81
4 1	49 „ 50	—	3	36	130	186	113	42
4 0	48 „ 49	—	6	56	165	166	70	24
3 11	47 „ 48	1	22	147	179	98	48	8
3 10	46 „ 47	7	54	170	176	78	14	2
3 9	45 „ 46	28	116	204	101	35	9	—
3 8	44 „ 45	33	163	167	60	12	1	—
3 7	43 „ 44	119	224	119	30	4	1	1
3 6	42 „ 43	190	199	61	11	2	1	—
3 5	41 „ 42	212	122	16	3	2	1	1
3 4	40 „ 41	198	55	6	1	1	—	—
3 3	39 „ 40	121	22	2	—	1	—	—
3 2	38 „ 39	56	8	1	—	—	—	—
3 1	37 „ 38	32	2	—	1	—	—	—
3 0	36 „ 37	3	1	—	—	—	—	—
Total.		1000	1000	1000	1000	1000	1000	1000
Average height.		41·19	43·35	45·52	47·58	49·39	51·34	53·42
Average growth.		—	2·16	2·17	2·06	1·79	1·97	2·08
Mean height.		41·0	43·5	45·5	47·5	49·5	51·5	53·5
Mean growth.		—	2·5	2·0	2·0	2·0	2·0	2·0
Age last birthday.		5	6	7	8	9	10	11

and the Annual Rate of Growth, of 10,904 GIRLS *in U.S. Statistical Data were collected in nearly all the Public-Schools in South Boston, Roxbury, Charleston, and Jamaica Plain, several of the Public Schools of Brooklyn.' See the 'Growth Report State Board of Health of Mass., Boston, U.S.A.,* 1877.

Age last birthday.							HEIGHT (without shoes).	
12	13	14	15	16	17	18		
935	830	675	459	353	233	155	10,904	
							Average Inches.	Mètres.
—	1	—	—	—	4	—	69·5	1·765
—	—	1	—	—	4	6	68·5	1·740
1	1	2	6	14	13	26	67·5	1·715
1	—	4	13	14	22	13	66·5	1·689
2	4	11	31	54	47	39	65·5	1·664
3	7	34	59	76	82	135	64·5	1·638
6	29	47	107	133	163	71	63·5	1·613
10	38	92	124	173	202	181	62·5	1·587
19	90	153	203	161	150	194	61·5	1·562
39	117	196	174	145	107	155	60·5	1·537
70	139	148	124	105	116	116	59·5	1·511
81	122	126	83	68	52	45	58·5	1·486
109	132	86	44	37	30	13	57·5	1·460
142	98	47	15	17	4	6	56·5	1·435
137	87	27	13	—	4	—	55·5	1·410
119	70	16	4	—	—	—	54·5	1·384
111	39	5	—	—	—	—	53·5	1·359
65	13	4	—	—	—	—	52·5	1·333
46	7	1	—	—	—	—	51·5	1·308
23	3	—	—	—	—	—	50·5	1·283
8	1	—	—	—	—	—	49·5	1·257
6	1	—	—	—	—	—	48·5	1·232
2	—	—	—	—	—	—	47·5	1·206
—	1	—	—	—	—	—	46·5	1·181
—	—	—	—	—	—	—	45·5	1·156
—	—	—	—	—	—	—	44·5	1·130
—	—	—	—	—	—	—	43·5	1·105
—	—	—	—	—	—	—	42·5	1·079
—	—	—	—	—	—	—	41·5	1·054
—	—	—	—	—	—	—	40·5	1·028
—	—	—	—	—	—	—	39·5	1·003
—	—	—	—	—	—	—	38·5	0·978
—	—	—	—	—	—	—	37·5	0·952
—	—	—	—	—	—	—	36·5	0·927
1000	1000	1000	1000	1000	1000	1000	Total.	
55·88	58·16	59·94	61·10	61·59	61·92	61·95	Average height.	
2·46	2·26	1·78	1·16	0·49	0·33	0·03	Average growth.	
56·0	58·0	60·0	61·0	61·5	62·0	62·0	Mean height.	
2·5	2·0	2·0	1·0	0·5	0·5	—	Mean growth.	
12	13	14	15	16	17	18	Age last birthday.	

TABLE XI. *Showing the actual, average, and mean* WEIGHT, *of America, between the Ages of*

WEIGHT (including clothes).		Age last birthday.						
		5	6	7	8	9	10	11
No. of observations.		605	987	1199	1299	1149	1089	936
Stones.	From Lbs.							
	158 to 222	—	—	—	—	—	—	—
11·0	154 „ 158	—	—	—	—	—	—	—
	150 „ 154	—	—	—	—	—	—	—
	146 „ 150	—	—	—	—	—	—	—
	142 „ 146	—	—	—	—	—	—	—
	138 „ 142	—	—	—	—	—	—	—
	134 „ 138	—	—	—	—	—	—	—
	130 „ 134	—	—	—	—	—	—	—
9·0	126 „ 130	—	—	—	—	—	—	—
	122 „ 126	—	—	—	—	—	—	—
	118 „ 122	—	—	—	—	—	—	1
	114 „ 118	—	—	—	—	—	—	1
	110 „ 114	—	—	—	—	—	—	2
	106 „ 110	—	—	—	—	1	1	4
	102 „ 106	—	—	—	—	1	3	5
7·0	98 „ 102	—	—	—	—	—	1	7
	94 „ 98	—	—	—	—	1	2	4
	90 „ 94	—	—	—	1	—	5	19
	86 „ 90	—	—	—	—	1	10	34
	82 „ 86	—	—	—	—	4	8	39
	78 „ 82	—	—	—	—	3	18	60
	74 „ 78	—	—	—	3	7	41	102
5·0	70 „ 74	—	1	—	6	31	76	139
	66 „ 70	—	1	2	10	45	143	140
	62 „ 66	—	1	9	36	123	159	160
	58 „ 62	—	3	28	106	197	218	139
	54 „ 58	5	16	91	203	248	168	96
	50 „ 54	21	68	178	263	194	104	35
	46 „ 50	45	180	284	219	98	34	13
3·0	42 „ 46	201	317	265	122	39	6	—
	38 „ 42	384	287	125	26	6	2	—
	34 „ 38	265	118	17	5	1	1	—
	30 „ 34	76	8	1	—	—	—	—
	26 „ 30	3	—	—	—	—	—	—
Total.		1000	1000	1000	1000	1000	1000	1000
Average weight.		39·66	43·28	47·46	52·04	57·07	62·35	68·84
Average growth.		—	3·62	4·18	4·58	5·03	5·28	6·49
Mean weight.		40·0	44·0	48·0	52·0	56·0	60·0	64·0
Mean growth.		—	4·0	4·0	4·0	4·0	4·0	
Age last birthday.		5	6	7	8			

and the Annual Rate of Increase, of 10,904 GIRLS *in U.S.* 5 *and* 19 *Years* (*see Table X.*).

Age last birthday							WEIGHT (including clothes).	
12	13	14	15	16	17	18		
935	830	675	459	353	233	155	10,904	
							Average Lbs.	Kilos.
1	1	2	2	5	17	17	190	86·4
—	—	3	2	3	4	—	156	70·9
—	—	1	2	5	—	—	152	69·1
—	1	3	—	3	9	—	148	67·3
—	—	—	8	3	13	26	144	65·4
—	—	6	7	11	34	6	140	63·6
1	1	7	19	37	43	39	136	61·8
1	1	3	20	42	43	71	132	60·0
3	6	18	22	68	61	58	128	58·2
3	6	18	37	71	95	103	124	56·4
3	16	27	74	99	69	58	120	54·5
6	29	50	68	93	70	65	116	52·7
11	24	59	96	85	142	161	112	50·9
6	41	95	109	108	163	65	108	49·0
18	77	85	153	105	86	142	104	47·3
19	65	116	136	82	48	97	100	45·4
33	84	107	72	74	47	58	96	43·6
57	95	104	63	40	30	13	92	41·8
85	107	92	37	40	5	13	88	40·0
108	88	74	37	9	17	6	84	38·2
120	87	74	15	11	—	—	80	36·4
109	100	18	15	3	4	—	76	34·5
138	78	22	6	3	—	—	72	32·7
117	41	10	—	—	—	—	68	30·9
81	29	5	—	—	—	—	64	29·1
53	17	1	—	—	—	—	60	27·3
21	5	—	—	—	—	—	56	25·4
5	1	—	—	—	—	—	52	23·6
1	—	—	—	—	—	—	48	21·8
—	—	—	—	—	—	—	44	20·0
—	—	—	—	—	—	—	40	18·2
—	—	—	—	—	—	—	36	16·4
—	—	—	—	—	—	—	32	14·5
—	—	—	—	—	—	—	28	12·7
1000	1000	1000	1000	1000	1000	1000	Total.	
78·31	88·65	98·43	106·0	112·0	115·5	115·1	Average weight.	
9·47	10·34	9·78	7·65	5·95	3·50	—	Average growth	
76·0	88·0	96·0	104·0	110·0	112·0	114·0	Mean weight	
10·0	12·0	8·0	8·0	6·0	2·0	2·0	Mean gro	
12	13	14	15	16	17	18	Age	

Diagrams and Chart-tracings.

The *Chart-tracings* given at pages 96 and 112 will illustrate the manner of using the ruled portion of the Anthropometrical Chart. Diagram I. shows the mean height, weight, and chest-girth, and the relation of the weight to the height of the boys and men enumerated in Tables I. II. and III. Diagram II. shows the growth of the body in height from birth to thirty years of age; and Diagram III. its development in transverse diameter and in circumference.

The tracings require little explanation: Diagram I. reads from left to right; the names of the parts measured and the weights are, according to the directions, given in the charts and written above the tracings; and the reference numbers to the Systematic Table of Measurements are also given. The dotted line representing the weight of the body without clothes has been constructed by deducting 9 lbs. for the weight of the clothes, which were included when the observations were made.

Diagram II. reads across the page from left to right, and shows the annual rate of growth from birth to thirty years of age of the parts indicated by the names and the reference numbers in a typical or mean man in this country.

Diagram III. reads from the middle of the page to the right and left, and shows the rate of increase of

the body in breadth and circumference during the same period of life. The black lines of Diagram III. represent a transverse section of the body at birth, and at the ages of 1, 3, 7, 15, and 30 years; or they show the space which would be covered by the body if laid flat on the table, by the head, the shoulders, the chest, the abdomen, and the hips. The dotted lines show the circumferences of the same parts—*i.e.* they indicate the ends of a tape which has been passed round the body and spread out on the table. The proper distances between the parts measured are not, of course, given, as the variations of the heights with age would prevent the parallelism of the lines. It will be understood that similar tracings can be made of any other parts of the body—the arms, legs, &c.

NOTE. Artists engaged in representing the human form may accept the tracings on Diagrams II. and III. as scales of proportions of the body, not necessarily for exact imitation, but as supplying measurements which will help them to find the relative proportions of the body, and place some reasonable limits to their imaginations. Year by year many of our English artists are departing farther and farther from the natural proportions, and the formulæ adopted and taught by the most distinguished artists of the Renaissance. A passing visit to the National Gallery and to the Royal Academy and the Grosvenor Galleries will sufficiently demonstrate the truth of this assertion, and it is unnecessary to specify any particular examples.

CHAPTER VII.

THE PHYSICAL DEVELOPMENT* AND THE PROPORTIONS OF THE HUMAN BODY.

THE following summary of what we already know of the development and the proportions of the body will be useful to the student of anthropometry, and indicate the nature and direction of his labours. The art-student may also consult this chapter with advantage.†

A glance at the tables will show how impossible it is to study the progressive development of man, and the causes which check or promote it, by the use of mere averages. In a thousand men or boys the average represents only a small fraction of the

* 'The term growth ought strictly to be confined to mere increase of size, and development to changes of structure. Now, a child is said to grow into a man, and a foal into a horse; but, as in these cases there is much change of structure, the process properly belongs to the order of development' (p. 389). 'The child, strictly speaking, does not grow into the man, but includes germs which slowly and successively become developed and form the man' (p. 404). *The Variation of Animals and Plants under Domestication.* By C. Darwin, M.A., F.R.S. (London, 1868).

† For further details, see Quetelet's *Anthropometry*, page 253.

whole number of the same age, and differs from groups above and below it by containing only a few more individuals. The difference in height between an average public-school boy of the age of 13½ and 14½ is about 2 inches, but the difference between the tallest and shortest boys of either of these ages is 20 inches, while at birth they differed to the extent of not more than 9 inches, and probably much less. As I have already observed, it is the variations of the individuals above and below the average or mean which is significant of the agencies at work in modifying the development of the body; and it is for this reason that I have given the whole range of heights which I have found to occur at each age, and which explains the formidable array of figures which the tables present.

The permanent and constant elements which modify the development of the human body are age, sex, and race, and some of the secondary and temporary ones are disease, occupation, social habits, nurture, food, exercise, rest, &c.

In my tables no attempt has been made to distinguish the original racial elements; but Dr. Beddoe has shown on the adult population that Northern or Scandinavian element is larger than Teutonic, and the Teutonic than the Celtic.

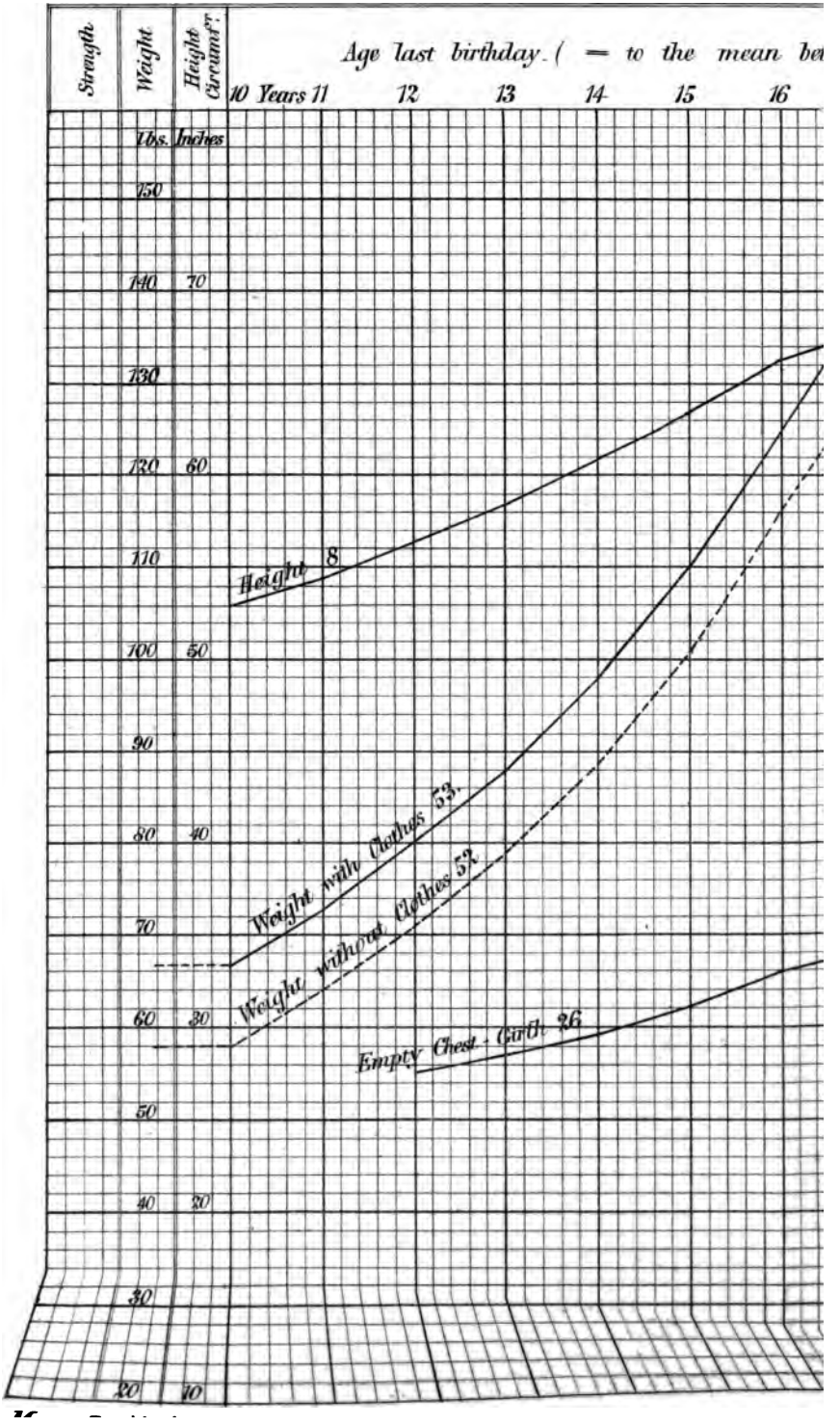
The tables sufficiently indicate the cl

take place in the height, according to the age; and the double series of observations for each age of the artisan and non-labouring classes, show the modifying influences of social surroundings on the development. During the periods over which the observations extend, the most favoured class has a mean height of about two inches greater than the industrial class, but it is probable that if the observations were extended to the time of birth they would gradually approximate, and become identical at that epoch.

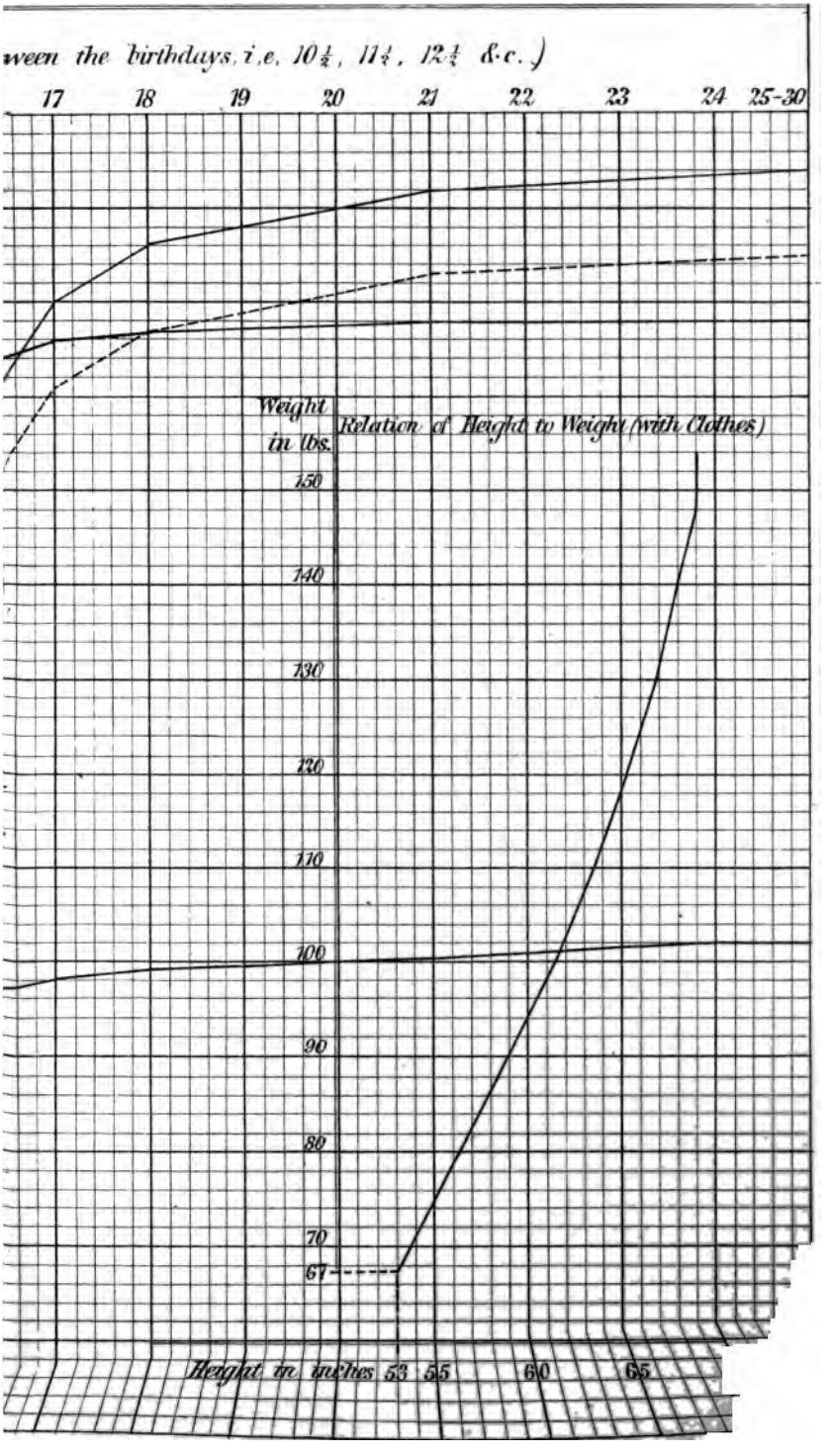
The total height of the new-born infant differs but little in the two sexes, the average for boys being 19·34 inches, and for girls 18·98 inches, the difference being rather less than half an inch. This difference, slight in infancy, maintains itself till near the age of thirteen years, when, in this country and America at least, the average girl is taller and heavier than the boy. This halting, so to speak, of the male, is speedily recovered; and the superiority is maintained to the period of full development, when the proportions of the two sexes stand as 1 to 0·937, or of 16 to 15.

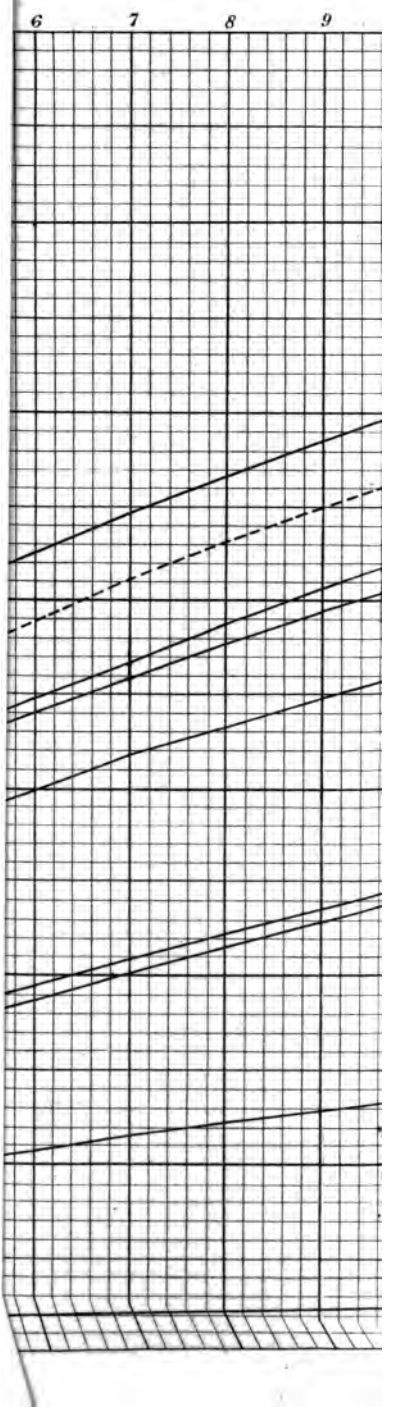
Quetelet's observations show that both men and women maintain their maximum height till the age of fifty years, when it begins to recede, and at the age of ninety has lost about 1½ inches. This diminution of the height by advancing years is to be at

in Tables I, II, and III, and th



he mean Heights, Chest-girths, and Weights, given
relation of the Weight to the Height.

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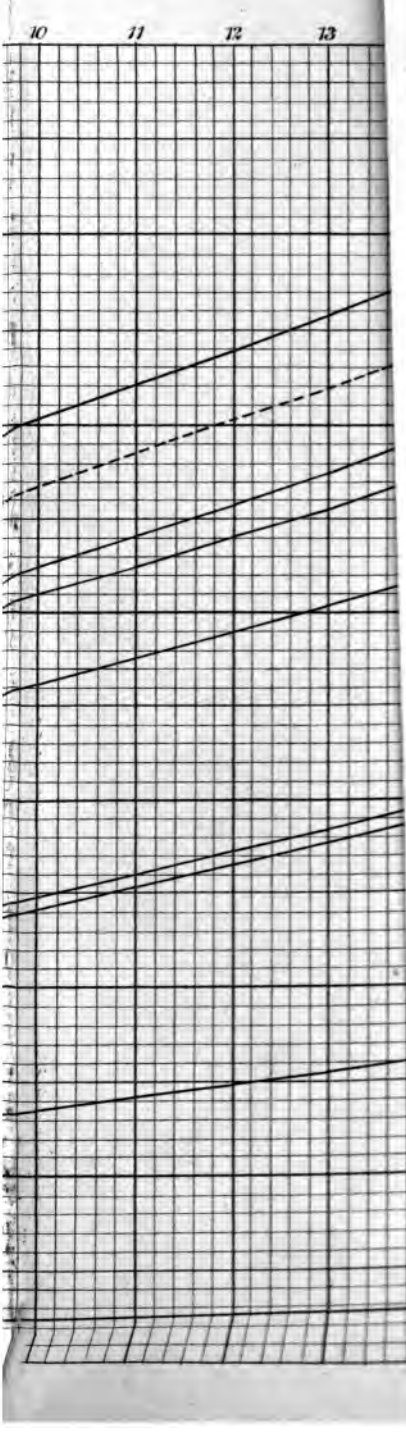
e Human Body in Height fro



tributed to the contraction of the soft parts between the ends of the bones, especially the cartilages of the spinal column, and to the stooping position assumed by old people. In considering the absolute height, the growth is most rapid in the first year, when it amounts to about $7\frac{3}{4}$ inches; during the second year it is already reduced one-half, being a little less than 4 inches; and it becomes gradually less till the age of twelve, when it is reduced to about $1\frac{1}{2}$ or 2 inches, according to the social condition. With the accession of puberty there is an increased rate of growth in the non-labouring classes, and an entire cessation of it at the age of nineteen or twenty years; while in the artisan classes the growth is more uniform, and extends to about the twenty-third year.

The height of woman is less than that of man, for three different causes: firstly, the woman is born a little smaller; secondly, her annual rate of growth after the age of fourteen is feebler; and thirdly, her growth terminates about two years before that of man. It is to this last cause above all that the difference in height must be attributed; for while at the age of thirteen girls are a little taller than boys, at the period of full development women are nearly 4 inches shorter than men.

'In considering a particular individual,' says M. Quetelet, 'his growth is far from being as regular as

that indicated in the tables. There are nearly always points at which the development of a person is arrested, as also there are times of growth more or less rapid. These anomalies are observed about the age of puberty and after illness. Favourable circumstances would have to be simultaneous for all the physical faculties to develop themselves in a perfectly regular manner. When we look on a great number of persons these little anomalies disappear in the general means, and what is wanting in the development of one is compensated for by an excess of growth in another.'

About the age of fifteen a rapid development in height takes place. This growth precedes puberty, and a similar change shows itself in the girls, but from one to two years earlier. It is probably to the greater or less development of the body at the time of the accession of puberty that the final difference in the height of individuals is chiefly to be attributed; hence the influences which promote or retard growth at this period are most deserving of study. In boys puberty occurs later, and is less regular and decided, than in girls. The transition from boyhood to manhood extends over a period of three or four years, and is accompanied by increased physical development of the body; but girls develop into women in a few months, and with the complete establishment of puberty growth in height is much diminished, and

often ceases altogether. This subject would be best illustrated by making a series of successive annual measurements of the same individuals (especially of girls), a labour, however, which could only be effectually carried out by a large number of observers.

The tables of heights of boys show that the pre-pubertic growth begins about the age of 12½ or 13 years in the non-labouring class, and causes not only a higher mean, but a wider range, between the tallest and shortest boys than among the labouring class, amongst whom the pre-pubertic growth does not show itself till a year or two later.

The contrast presented by the columns of figures representing the non-labouring and the artisan class from the age of twelve to seventeen shows the marked effect of social surroundings on the development of the body; the one class being retarded and depressed by laborious occupations and insanitary influences, the other expanded, and probably exaggerated, by the prevalence of circumstances favourable to growth. The position of the body influences the stature. The upright position retards development in height, while the recumbent position—even though nutrition may be impaired by disease—favours increase of stature, as we often see in delicate children.

Tables XII. and XIII. show the average height and weight of different classes of the English popu-

lation arranged on the plan recommended at page 42. Although each table comprises upwards of 54,000 observations the numerous blank spaces, especially at ages below five years, show how much labour remains to be done before we can arrive at safe conclusions as to the relative physique of different classes of the community.

The materials forming these tables have been derived from the following sources: The first division of Class I. is given in detail in Tables I. and II., and is explained at page 65. The second division of Class I. are chiefly townbred boys attending the following town schools: Liverpool College; King Edward's School, Birmingham; City of London School; and Christ's Hospital. I have not been able to collect any statistics of Class II., but they will probably be found to differ little from the second division of Class I., just mentioned.

Class III. are the children of soldiers in the Royal Military Asylum, Chelsea, and the Royal Hibernian Asylum, Dublin; and recruits for the army in 1862-3. For these returns I am indebted to Drs. Crosse and Baxter, the Medical Superintendents of the Asylums; and for the recruits to Dr. Crosse's very intelligent Hospital Sergeant, Mr. P. Coughlan, who has also helped me in working out some of the averages of my tables.

Classes IV. and VIII. comprise the statistics collected by myself and other assistant commissioners for the Local Government Board, for the *Report on the Changes in the Hours and Ages of Employment of Children in Factories*, previous to the recent alterations in the Factory Acts.

The boys in Class V. are the children of sailors and coastguard men, being educated and trained for the navy in the Royal Hospital School, Greenwich, obtained through Mr. G. W. Armstrong, the resident medical officer.

The statistics in Class VII. are derived from various sources in large towns. Many of the boys were the applicants for appointments as messengers and clerks in the Telegraph Department of the General Post Office, and the rejected as well as the accepted candidates are included. I am indebted to Mr. Steet, the medical officer, for these returns.

The averages at the ages from twenty-three to thirty are collected from the statistics published in Dr. Beddoe's paper on the stature and bulk of man in the British Isles.

The heights and weights of the idiots and imbeciles are derived from the institutions enumerated at the head of the columns, and were collected for me by Drs. Grabham, Ireland, and Shuttleworth, the medical superintendents.

For the purpose of comparing together English and American born boys, I have added to the tables two columns of averages from Dr. Bowditch's report on the growth of children in Boston and the surrounding neighbourhood. As they include all classes of society and are both town and country bred, they do not correspond with any of the classes I have adopted, but it will be seen that they closely resemble the two divisions of Class I. of our English boys. I have to regret that I have not been able to include some statistics promised by my friend Dr. F. N. Manning of Sydney, to show if any changes have taken place in the physique of our Australian relations.*

The study of the extremes of the stature which the body may attain in giants and dwarfs is full of interest and importance. Giants and dwarfs occur at all ages; but as growth is very irregular in many individuals, sometimes being excessive at an early age and occasionally retarded for years, the true giant

* It does not form part of my present plan to point out the numerous interesting conclusions to be drawn from these tables. My object here is to show how imperfect our information is, and to endeavour to direct into proper channels the labours of many different observers. Statistics of the kind embodied in my tables, collected, apparently, without any definite object, lie scattered all over the country, and many opportunities of adding to them are lost for want of an intelligent motive. I hope that my present work will explain the object, and supply a motive for more extended efforts.

and dwarf can only be distinguished at the time of full development, unless, indeed, the proportions are very unusual. In the giant the great stature is due, chiefly, to an excessive growth of the lower extremities, the size of head and trunk being nearly the same as that of the mean boy or man of the same age. The Swedish giant was about 8¼ feet in height, being the tallest man on record. In the natural dwarf, where the proportions are fairly uniform, the head is always large in proportion to the rest of the body, as it is in the young child; indeed, the proportions of the dwarf Tom Thumb are almost exactly those of an ordinary infant of from thirteen to fifteen months old.

TABLE XII. *Showing the average* HEIGHT *(without shoes) of* 54,447 *Boys* 4630 *of American*

Male population and percentage, including children, 1871.	Professional classes.				Commercial classes.				Labouring			
	Class I.				Class II.		Class III.		Class IV.		Class V.	
	328,270 =4·46 per cent.				762,014 =10·36 per cent.		439,377 =5·97 per cent.		2,383,799 =32·41 per cent.		232,784 =3·16 per cent.	
Social position, occupation, 'nurture.'	No occupation. Officers of Army and Navy. Clergymen. Physicians and Surgeons. Barristers and Solicitors. Civil Servants. Bankers. Merchants.				Clerks. Shopkeepers.		Soldiers. Policemen. Messengers. Servants.		Labourers: Agricultural, Roads, Quarries, Navvies, Railways.		Sailors. Fishermen. Bargemen.	
Sanitary surroundings.	Outdoor. Country.		Indoor. Towns.		Indoor. Towns.		Selected.		Outdoor. Country.		Outdoor. Seafaring.	
Age last birthday.	No. obs.	Inches.	No. obs.	Inches.	No. obs.	Inches.	No. obs.	Inches.	No. obs.	Inches.	No. obs.	Inches.
Birth.	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	—	—	—	—	—
3	—	—	—	—	—	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—	—	—	—	—	—
5	—	—	—	—	—	—	138	41·25	—	—	—	—
6	—	—	—	—	—	—	287	42·97	—	—	—	—
7	—	—	3	46·16	—	—	730	45·22	—	—	—	—
8	—	—	16	47·31	—	—	860	46·98	133	46·91	—	—
9	—	—	59	50·18	—	—	826	48·94	156	49·43	—	—
10	74	53·40	160	52·73	—	—	783	50·31	143	51·33	356	51·04
11	150	54·91	294	53·84	—	—	840	51·20	138	52·94	166	52·07
12	248	56·97	495	55·51	—	—	426	52·52	100	55·19	20	54·15
13	473	58·79	501	58·30	—	—	415	54·65	9	56·05	393	55·30
14	477	61·11	508	59·84	—	—	1302	56·08	—	—	100	58·90
15	541	63·47	303	62·60	—	—	140	59·10	—	—	—	—
16	686	66·40	76	65·10	—	—	133	63·90	—	—	—	—
17	1602	67·86	57	66·74	—	—	870	65·91	—	—	—	—
18	1522	68·29	23	68·00	—	—	5246	66·78	—	—	—	—
19	794	68·72	3	69·16	—	—	3385	67·19	—	—	—	—
20	391	69·13	—	—	—	—	2466	67·26	—	—	—	—
21	326	68·90	—	—	—	—	1710	67·53	—	—	—	—
22	198	68·65	—	—	—	—	1568	67·62	—	—	—	—
23-30	170	68·66	—	—	—	—	3256	67·93	—	—	—	—
23-50	—	—	115	67·93	242	67·28	4144	67·22	1243	67·10	313	66·37
—	7652	—	2613	—	242	—	29525	—	1922	—	1348	—

and Men of different Classes (and of Idiots) of the English Population, and of Parentage (Boston, U.S.A.).

classes.		Industrial classes.						United States of America. Of American parentage.				
Class VI.		Class VII.		Class VIII.		IDIOTS and IMBECILES: Earlswood Asylum, Royal Albert Asylum, Larbert Institution for Imbeciles.		Public and private Latin Schools, Massachusetts Institute of Technology.		Public schools of the city of Boston, South Boston, Roxbury, Charlestown, Jamaica Plain, and Brooklyn.		
435,558 =5·92 per cent.		1,971,295 =26·82 per cent.		801,536 =10·9 per cent.								
Miners: Coal, Mineral.		Artisans.		Factory operatives. Sedentary trades: Tailors, Shoemakers, &c								
Underground.		Indoor. Towns.		Indoor. Towns.				Selected.		Town and Country.		
No. obs.	Inches.	No. obs.	Inches.	No. obs.	Inches.	No. obs.	Inches. Mean height.	No. obs.	Inches.	No. obs.	Inches.	Age last birthday. Birth.
—	—	100	19·34	—	—	—	—	—	—	—	—	1
—	—	—	—	—	—	—	—	—	—	—	—	2
—	—	—	—	—	—	—	—	—	—	—	—	3
—	—	—	—	—	—	—	—	—	—	—	—	4
—	—	21	38·45	—	—	3	38·00	—	—	—	—	5
—	—	37	40·10	—	—	13	40·03	—	—	201	41·74	6
—	—	40	43·27	—	—	34	42·23	—	—	342	44·10	7
—	—	53	45·70	—	—	41	44·12	—	—	369	46·21	8
—	—	110	46·88	162	46·90	54	45·74	—	—	407	48·16	9
—	—	295	48·97	276	48·46	57	47·49	2	52·00	381	50·09	10
—	—	279	50·77	419	50·21	72	49·11	19	53·51	360	52·21	11
—	—	175	52·60	3415	51·56	61	50·97	17	54·90	350	54·01	12
—	—	151	53·95	325	53·36	63	52·46	28	56·78	373	55·78	13
—	—	550	56·96	—	—	74	54·75	41	59·60	391	58·17	14
—	—	946	58·15	—	—	56	56·53	49	61·51	386	61·08	15
—	—	605	60·92	—	—	54	59·26	46	64·20	342	62·96	16
—	—	895	63·78	—	—	66	60·69	40	65·83	232	65·58	17
—	—	449	64·40	—	—	36	62·67	32	67·44	128	66·29	18
—	—	153	65·30	—	—	37	63·21	29		65	66·76	19
—	—	97	66·02	—	—	25	63·19	—	—	—	—	20
—	—	69	66·31	—	—	28	64·18	—	—	—	—	21
—	—	55	66·84	—	—	20	64·25	—	—	—	—	22
—	—	36	66·25	—	—	16	64·50	—	—	—	—	23-3
—	—	166	66·43	—	—	—	—	—	—	—	—	23-4
67	66·91	335	66·77	135	66·89	19	64·87	—	—	—	—	
67	—	5517	—	4732	—	829	—	303	—	4327	—	

TABLE XIII. *Showing the average* WEIGHT *(including clothes) of* 54,447 *Boys* 4630 *of American*

Male population and percentage, including children, 1871.	Professional classes.				Commercial classes.		Labouring					
	Class I.				Class II.		Class III.		Class IV.		Class V.	
	328,270 =4·46 per cent.				762,014 =10·36 per cent.		439, 377 =5·97 per cent.		2,383,799 =32·41 per cent.		232,7-4 =3·16 per cent.	
Social position, occupation, 'nurture.'	No occupation. Officers of Army and Navy. Clergymen. Physicians and Surgeons. Barristers and Solicitors. Civil Servants. Bankers. Merchants.				Clerks. Shopkeepers.		Soldiers. Policemen. Messengers. Servants.		Labourers: Agricultural, Roads, Quarries, Navvies, Railways.		Sailors. Fishermen. Bargemen.	
Sanitary surroundings.	Outdoor. Country.		Indoor. Towns.		Indoor. Towns.		Selected.		Outdoor. Country.		Outdoor. Seafaring.	
Age last birthday.	No. obs.	Lbs.	No. obs.	Lbs.	No. obs.	Lbs.	No. obs.	Lbs.	No. obs.	Lbs.	No. obs.	Lbs.
Birth.	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	*Weight*	—	—	—	—
3	—	—	—	—	—	—	—	*without*	—	—	—	—
4	—	—	—	—	—	—	—	*clothes*	—	—	—	—
5	—	—	—	—	—	—	138	37·31	—	—	—	—
6	—	—	—	—	—	—	287	40·67	—	—	—	—
7	—	—	3	54·83	—	—	728	45·33	—	—	—	—
8	—	—	16	60·00	—	—	860	48·78	133	54·53	—	—
9	—	—	59	62·02	—	—	824	53·56	156	61·60	—	—
10	74	67·44	160	66·34	—	—	781	56·48	143	67·03	356	69·36
11	150	72·94	294	69·66	—	—	840	59·19	138	72·78	166	74·10
12	248	80·33	495	75·12	—	—	426	63·02	100	77·28	20	77·97
13	473	88·66	501	81·94	—	—	414	70·82	9	83·83	393	88·22
14	477	99·21	508	92·24	—	—	1302	80·57	—	—	100	98 58
15	541	110·42	303	105·30	—	—	140	95·91	—	—	—	—
16	686	128·34	76	118·75	—	—	133	110·80	—	—	—	—
17	1602	141·03	57	127·50	—	—	870	124·01	—	—	—	—
18	1522	146·00	23	140·00	—	—	5246	129·43	—	—	—	—
19	794	148·20	3	141·16	—	—	3386	133·51	—	—	—	—
20	391	152·07	—	—	—	—	2466	136·49	—	—	—	—
21	326	152·34	—	—	—	—	1710	137·92	—	—	—	—
22	198	152·06	—	—	—	—	1568	139·19	—	—	—	—
23-30	170	152·00	—	—	—	—	3256	141·10	—	—	—	—
23-50	—	—	70	162·10	242	146·74	4144	138·27	1243	149·22	228	163·10
Weight of clothes (approximative).	Age 5 to 10, — 10 to 30, 9 lbs.		—	6 lbs. 9 lbs.	—	—	—	7 lbs. 10 lbs.	—	7 lbs. 10 lbs.	—	7 lbs. 10 lbs.

and Men of different Classes (and of Idiots) of the English Population, and of Parentage (Boston, U.S.A.).

classes.		Industrial classes.						United States of America. Of American parentage.				
Class VI.		Class VII.		Class VIII.		IDIOTS and IMBECILES: Earlswood Asylum, Royal Albert Asylum, Larbert Institution for Imbeciles.		Public and private Latin Schools, Massachusetts Institute of Technology.		Public schools of the city of Boston, South Boston, Roxbury, Charlestown, Jamaica Plain, and Brooklyn.		
435,558 =5·92 per cent.		1,971,295 =26·82 per cent.		801,536 = 10·9 per cent.								
Miners: Coal, Mineral.		Artisans.		Factory operatives. Sedentary trades: Tailors, Shoemakers, &c.								
Underground.		Indoor. Towns.		Indoor. Towns.				Selected.		Town and Country.		
No. obs.	Lbs.	No. obs.	Lbs.	No. obs.	Lbs.	No. obs.	Lbs. Mean weight.	No. obs.	Lbs.	No. obs.	Lbs.	Age last birthday.
—	—	100	7·55	—	—	—	—	—	—	—	—	Birth.
—	—	—	—	—	—	—	—	—	—	—	—	1
—	—	—	—	—	—	—	—	—	—	—	—	2
—	—	—	—	—	—	—	—	—	—	—	—	3
—	—	—	—	—	—	3	35·0	—	—	—	—	4
—	—	—	—	—	—	13	39·0	—	—	127	39·8	5
—	—	—	—	—	—	34	43·0	—	—	236	43·8	6
—	—	—	—	—	—	41	46·5	—	—	346	48·0	7
—	—	110	58·73	173	54·07	54	50·5	—	—	338	52·9	8
—	—	296	63·31	331	58·56	57	52·5	2	60·1	323	57·5	9
—	—	281	68·96	411	61·55	72	59·0	19	70·6	336	64·1	10
—	—	175	73·94	345	66·68	61	64·5	17	75·3	290	70·2	11
—	—	146	77·64	319	70·57	63	70·5	28	85·9	309	81·3	12
—	—	606	89·82	18	77·40	74	77·0	41	94·4	307	91·9	13
—	—	892	96·84	—	—	56	85·5	49	99·9	290	100·3	14
—	—	770	107·25	—	—	54	94·5	46	116·0	255	108·4	15
—	—	895	117·51	—	—	66	103·0	40	125·8	238	112·9	16
—	—	501	126·53	—	—	36	110·0	32	135·2	168	115·8	17
—	—	145	133·14	—	—	37	116·0	29	138·2	118	115·8	18
—	—	105	138·39	—	—	25	120·5	—	—	—	—	1
—	—	—	—	—	—	28	121·5	—	—	—	—	2
—	—	122	140·22	—	—	20	122·0	—	—	—	—	21
—	—	39	141·13	—	—	16	122·5	—	—	—	—	27
—	—	121	144·73	—	—	—	—	—	—	—	—	2[illegible]
67	148·21	335	142·52	135	144·49	19	123·0	—	—	—	—	2[illegible]
—	—	—	6 lbs.	—	7 lbs.	—	6 lbs.	At 5, 2¾ lbs.		At 8, 4 lbs.		
—	—	—	9 lbs.	—	10 lbs.	—	9½ lbs.	At 12, 7½ lbs.		At 15, 8 "		

1. *Of the Proportions of the Head.*

The head is one of the most essential parts of the body, and is more completely developed at birth and varies least in its proportions during growth. Being least liable to change, it has from the earliest times been made the standard for judging of the height and other proportions of the body. In the adult it is generally considered as forming the seventh part of the whole height. The proportion may, however, vary between six and eight, and in the case of giants, nine times; while in dwarfs it may form a fourth part of the height. At other periods of life it is not available as a standard, as the head and the other portions of the body do not increase in the same proportions. From birth to the period of full development the head only doubles its height, while the whole body elongates three or four times its original dimensions.

The following table (from Quetelet) shows the height of the head, and the ratio between the height of the head and that of the whole body, at different ages, in both sexes:

Age.	Men.			Women.		
	Total height.	Height of head.	Ratio.	Total height.	Height of head.	Ratio.
	Inches.	Inches.		Inches.	Inches.	
Birth.	19·68	4·37	4·50	19·44	4·37	4·45
1 year.	27·48	6·06	4·53	27·16	6·06	4·48
2 years.	31·14	6·81	4·57	30·74	6·77	4·54
3 „	34·03	7·16	4·74	33·64	7·08	4·74
5 „	38·86	7·56	5·14	38·34	7·40	5·18
10 „	50·11	8·07	6·21	49·37	7·91	6·21
15 „	59·56	8·46	7·04	58·58	8·39	6·99
20 „	65·74	8·93	7·35	61·96	8·68	7·13
30 „	66·37	8·97	7·39	62·20	8·90	7·13
40 „	66·37	8·97	7·39	62·20	8·90	7·13

From these figures it will be seen that the height of the head varies little in the two sexes, and it is at the time of birth half what it will attain to after the complete development of the individual. The increase is greatest during the first and second years, when it amounts to 2·44 inches. At the age of adolescence growth has almost terminated, and at the full period of development it has attained nearly 9 inches. It would appear, from M. Quetelet's observations, that the lower parts of the face grow at a greater rate than the upper; for the nasal insertion which, after the age of puberty, divides the face into two equal parts, is in infants nearer the chin than the vertex.

The antero-posterior diameter of the head is a greater at birth than the transverse, and this preserved through life. The difference bet diameter and height of the head at birth

1·73 inches, but in adult life this is reduced to half an inch. All the horizontal measurements of the head develop less than those of height; the ratio of those of height being as 1 to 2, the transverse as 2 to 3.

2. *Of the Neck.*

The growth of the neck is nearly the same as that of the head, but is less than that of the trunk, and is more perceptible in man than in woman. At birth the height of the neck is about an inch, but on account of the plumpness of the infant's chin it shortens, and it is not till the sixth or seventh year that it disengages itself and commences to grow perceptibly. After adolescence its height is about 2 inches. The ratio of growth in man is as 1 to 2; in woman as 1 to 1·79.

The diameter of the neck taken a little above the clavicles is about 1·81 inches at birth. It develops rapidly during the first year, and at the age of six years it is about $2\frac{1}{4}$ inches for both sexes. At the age of puberty the growth becomes more rapid, especially in women; and when development has terminated both diameters of the neck are about $4\frac{3}{4}$ inches. The circumference of the neck immediately below the chin grows in the ratio of 1 to 2·31 in men, and of 1 to 2·09 in women.

3. *Of the Trunk.*

The trunk is the part of the body which is included between the clavicles above and a horizontal line passing under the perineum or fork; and consists of the *chest*, the *abdomen*, and the *pelvis*.

We have seen that the height of the head increases, progressively and at the period of full development is doubled; the height of the neck increases less regularly at first, but ultimately it attains double its original dimensions. The other parts of the body increase with greater energy, and we find that the growth is greater the further the parts are situated from the summit of the head. Thus, while the measurements of the head and neck are only doubled, those of the trunk are tripled, and those of the lower extremities are more than quadrupled.

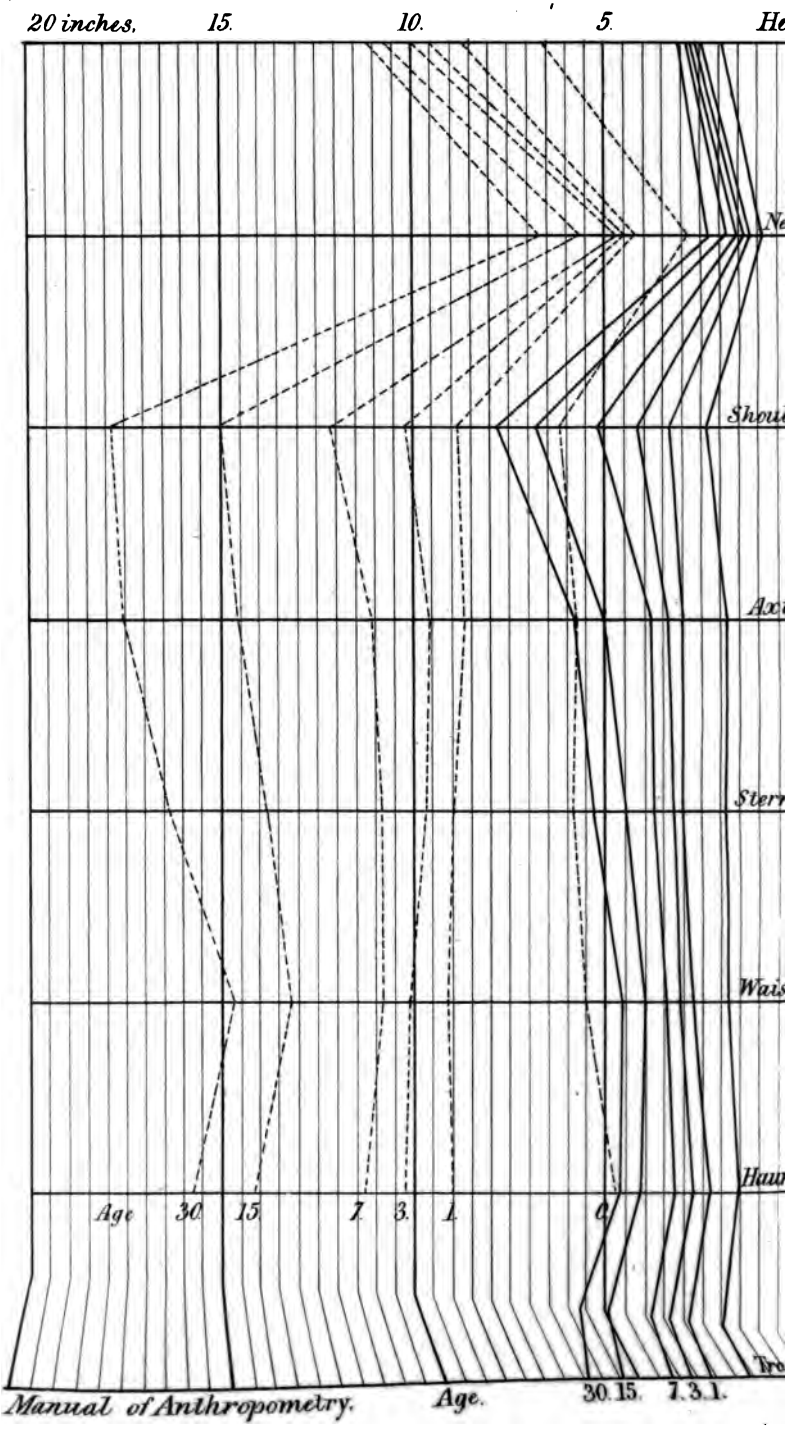
The *diameters* of the trunk, with respect to *width*, grow nearly in the same ratio as the height; they triple from birth to the period of full development. At the age of six or seven years the diameters at the shoulders, the chest, and the hips at the trochanters are doubled. The *diameters* of the trunk with respect to *thickness* grow less rapidly. The diameter of the chest from front to back only doubles towards the age of puberty, and from birth it grows only in the ratio of 1 to 2·36.

The *circumference* of the trunk grows in almost the same proportion as the height and transverse diameters. At puberty the circumferences of the trunk are much modified by sex; the shoulders are proportionably broader in man and the hips in woman, though the difference is much less than is generally believed. The development of the breasts in woman renders the chest-girth exceedingly variable, as does also her costume the circumference of the waist.

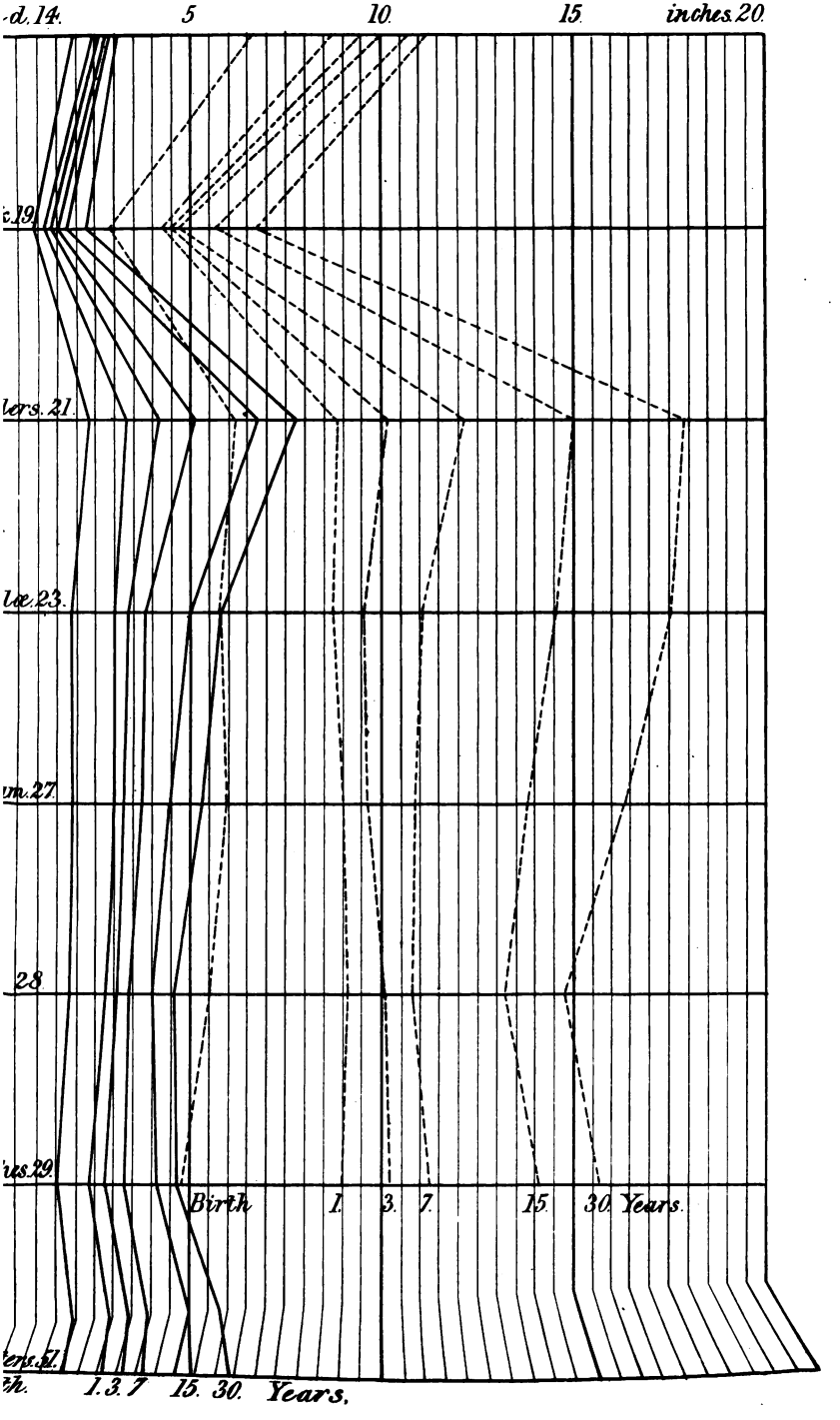
From the great importance to life of the organs contained within the chest, the circumference of that portion of the trunk has been selected, together with the total height and weight of the body, to determine the physical capacity of the individual for military or other duties. Tables III. and VIII. give the results of the measurement of the *empty* chest of males from the age of 5 to 30 years.

At the time of birth, when the child is about the sixth of the height it will ultimately attain to, the point which divides the total height into two equal parts is a little above the navel; at two years of age it is at the navel; at three years, when the child has attained half its total height, the central point is on a line with the upper borders of the iliac bones; at ten years of age, when the child has attained three-fourths of its total height, the central point is on a line with the trochanters; at thirteen years it is at

III. Diagram showing the development of
(the Black lines) and in Circumfer



the Human Body in transverse diameter.
ce (the dotted lines) see page. 92.



the pubes, and in the adult man it is nearly half an inch lower. In the adult woman the central point is a little above the pubes. Proportions being kept, the distances from the vertex to the various parts of the trunk are greater in woman than in man.

4. *Of the Upper Extremities.*

The upper extremity extends from the acromial end of the clavicle (the bony prominence of the shoulder) to the tip of the middle finger, and consists of three portions—the *arm*, comprised between the acromion projection and the external condyle of the humerus (the bony prominences above the elbow); the *forearm*, extending from the points just mentioned to the styloid process of the radius at the root of the thumb; and the *hand*.

It is generally believed that the space covered by the arms extended horizontally is equal to the total height of the man; but this is true only within certain limits, namely, from the time of birth to that of puberty; and this is equally true of both sexes, the difference, indeed, being less in girls than in boys. After puberty more decided changes in the proportions take place, the horizontal being greater than the perpendicular measurement, especially in men, whose chest and shoulders have a greater development in breadth than women. The ratio of height

to the measurement of the extended arms is in the adult man as 1 to 1·045, and in woman as 1 to 1·015.

The length of the arm, without including the hand, is doubled at the age between four and five years, tripled between thirteen and fourteen years, and quadrupled at the period of full development. The *hand* develops less rapidly. Its length is doubled between five and seven years, and tripled at adult age. The length of the hand, like the height of the head and the length of the foot, has been employed by artists, sculptors, and authors as a standard of the proportions of the body, its length having the ratio to the total height of the individual of 1 to 9 from about the age of seven or eight years to adult life; before that age the hand is comparatively a little longer. These proportions are truer for the woman than the man. In proportion to the length, the hand is a little broader in women.

The *forearm* is the part which increases most sensibly in length; in the new-born infant it measures about $2\frac{1}{4}$ inches, and in the adult $9\frac{1}{2}$ inches, the growth being in the ratio of 1 to 4·26. The 'cubit,' or the length of the forearm of the adult, was the unit of measurement among the ancients.

The *arm* (between the shoulder and elbow) measures at birth $3\frac{1}{2}$ inches, and in the adult 13 inches; these numbers are in the ratio of 1 to 3·78.

The circumferences at the biceps and at the elbow increase nearly at the same rate, but more rapidly than the hand, viz. from 1 to $2\frac{3}{4}$ nearly. The circumference of the biceps and the thickest part of the forearm is about the same in the adult; but both these measurements are liable to great variation under the influence of disease, exercise, &c.

5. *Of the Lower Extremity.*

The lower extremity includes the *thigh*, the *leg*, and the *foot*, and is joined to the trunk on a line with the trochanters. To determine the share it takes in forming the *total height* of the individual, it is necessary to measure the distance from the perineum, or fork, to the sole of the foot; but as the relative position of the perineum is liable to vary, from obesity and other causes, measurements for determining the size of the *limb* should be made from the trochanters to the sole. The division between the thigh and the leg is at the lower edge of the patella or knee-cap, and between the leg and the foot at the bony prominences above the ankle joint—the *malleoli.*

It has been already observed that the lower extremities develop more rapidly and in greater relative proportions than other parts of the body. Thus from birth to maturity, while the head and neck double their height, and the trunk increases to three times

its original proportions, the lower extremities in the adult are five times the length they were in the new-born infant. The upper extremities grow less rapidly, the arms of the adult man being only four times the length they were at birth. Measuring from the fork to the sole of the foot, the lower limbs double their length before the third year; at twelve years they are four times, and at twenty years five times, their original length. The thigh, the leg, and the foot do not increase in the same proportions.

The length of the *thigh*, measuring from the fork to the patella or knee-cap, is $1\frac{3}{4}$ inches in the new-born child, and nearly 13 inches in the fully developed man. These numbers are in the ratio of 1 to 7·31, and this portion of the limb acquires seven times its primitive length, an increase much greater than takes place in any other part of the body. The length of the thigh, measured from the trochanter to the knee-cap, is at birth 3·15 inches, and in the adult 15·75 inches—numbers having the ratio of 1 to 5. The length of this part of the body varies greatly in different individuals, and on it depends much of the inequality of their total heights.

The length of the *leg*, measuring from the lower edge of the patella to the inner malleolus at the ankle, is 3·42 inches at birth, and 15·35 inches in the adult, an increase in the ratio of 1 to $4\frac{1}{2}$.

The *height* of the foot, which is about an inch at birth, is $3\frac{1}{4}$ inches in man fully developed, an increase in the ratio of about 1 to 3. The *length* of the foot, from the heel to the extremity of the great toe, grows a little more rapidly than the height, the ratio of increase being as 1 to $3\frac{1}{2}$.

From these measurements it results that the thigh grows more than the leg, and the leg than the foot. Something similar was observed in the upper extremity, the forearm, however, having the greater growth. The *circumference* of the leg at the calf is nearly the same as that at the knee.

The *foot*, like the hand and the head, has been employed as a standard of the proportions of the body. At all ages of life and in both sexes it forms from the 0·15 to 0·16 of the total height of the individual; it is, however, comparatively a little longer at the period of adolescence, but rather shorter in children and adults. Taking the length of the foot for unity, the total height of man would be $6\frac{3}{4}$, and of women $6\frac{1}{4}$. It is generally believed that the length of the foot is equal to the height of the head; but this is only true of the age of ten years: before that period the head is longer, and after it shorter, than the foot. It is also said that the length of the foot is equal to the circumference of the fist; but

there appears to be no more foundation for this than the former opinion.

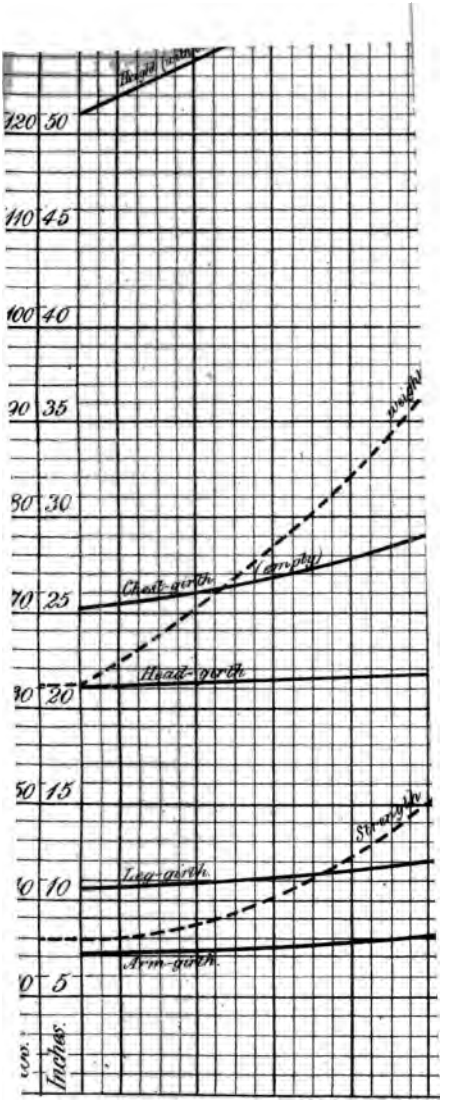
NOTE. The standards of the proportions of the body employed by ancient and Renaissance sculptors and artists were taken from different parts of the body; and although they are not of much value to science, they are full of interest to those who appreciate their incomparable works of art. They were:

The *cubit* of the Egyptians, or the distance between the elbow and the extremity of the fingers; it forms the fourth part of the height of man.

The *foot*, which forms the sixth part.

The *head*, which, according to Vitruvius, forms the eighth part; but, properly speaking, the head is contained seven and a half times in the height.

The *face* (volto), which is equal to the length of the hand, and is the ninth part of the total height.


Height (stature)
120 50
110 45
100 40
90 35
80 30
70 25
60 20
50 15
40 10
30 5
Weight
Chest-girth (empty)
Head-girth
Strength
Leg-girth
Arm-girth
cm.
Inches.

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Final Report of the Anthropometric Committee, consisting in 1882–3 *of* Mr. F. GALTON (*Chairman*), Dr. BEDDOE, Mr. BRABROOK (*Secretary*), Mr. FRANK FELLOWS, Mr. JAMES HEYWOOD, Professor LEONE LEVI, Dr. F. A. MAHOMED, Mr. J. E. PRICE, Lieut.-General PITT-RIVERS, Sir RAWSON W. RAWSON, *and* Mr. C. ROBERTS. *Associates*, Dr. T. G. BALFOUR, Dr. J. H. GLADSTONE, Inspector-General LAWSON, Dr. W. OGLE.[1] *Drawn up by* Mr. C. ROBERTS *and* Sir RAWSON W. RAWSON.

[PLATES IV.—X.]

1. THE Committee, originally appointed in 1875, and aided by successive grants, of which it has expended 280*l.*, has made a Report in each of the five years 1878 to 1882, and now submits its final Report.

2. Not that the work open to the Committee is exhausted, although it has to a great extent supplied what was pointed out in its Reports of 1881 and 1882 as chiefly wanting, or that its conclusions are to its own mind complete and satisfactory. But it would require more time and larger funds than are at the disposal of the Committee to prosecute its inquiries, even with the materials now in its possession, to the end which it has had in view; and the Committee is of opinion that the most useful course will be to bring before the Association the results of its past labours, indicating at the same time the conclusions which it considers to be sufficiently established by the facts ascertained, and the deficiencies, both of data and methods, which remain to be supplemented, either by individual exertion, or by the reappointment of a similar Committee at some future period under the auspices of the Association.

3. In order to furnish a complete review of the information obtained, it will be necessary to refer to tables and data contained in previous reports. A list of these Reports is furnished in a note.[2]

Objects and Operations of the Committee.

4. The Committee was appointed for the purpose of collecting observations on the systematic examination of the height, weight, and other physical characters of the inhabitants of the British Isles.

5. Its operations in each year are described in the introduction to its Report of 1881. The description and amount of the statistics which it has collected, and the names of the persons to whom it is indebted for the collection, are detailed chiefly at the commencement of its several Reports from 1880 to 1882.

6. Among the objects early aimed at by the Committee, and prosecuted by it up to the year 1881, was the collection and comparison of photographs of the typical races of the United Kingdom; but at the meeting of that year this inquiry was assigned to a separate Committee, upon whom will devolve the duty of reporting upon this branch of the general subject.

[1] The late Dr. William Farr was a member, and Chairman of the Committee from 1875 to 1879.

[2] 1, Report for 1878, 5 pp. (numbered pp. 182–6 in the Annual Report of the Association). 2, Report, 1879, 35 pp.; *ibid.* pp. 175–209. 3, Report, 1880, 41 pp.; *ibid.* pp. 120–59. 4, Report, 1881, 48 pp.; *ibid.* pp. 225–72. 5, Report, 1882, 3 pp.; *ibid.* pp. 278–80. An Index to the Tables is given in Appendix C.

7. The points to which the Committee has addressed its inquir are—

(1) Stature.
(2) Weight.
(3) Girth of chest.
(4) Colour of eyes } Complexion.
(5) ,, hair }
(6) Breathing capacity.
(7) Strength of arm.
(8) Sight.
(9) Span of arms.

To these might have been added others, especially—

(10) Size and shape of head.
(11) Length of lower limbs as shown by the difference betwe the sitting and standing positions.
(12) Girth, length, and breadth of other parts of the body.

But the Committee was afraid of seeking to obtain more informati than their contributors would be likely to furnish; and experience h shown that many of them have been unable to supply more than a p tion of that which was requested. Few have furnished complete retu on all the subjects, but where one has failed another has succeed and sufficient data have been collected to give trustworthy statisti results on all the subjects of inquiry except those of breathing capaci and sight. An abstract of one of the complete returns will be given its proper place, as exhibiting a good epitome of what the Committ has sought to obtain in all cases. (See Table XXIII.)

8. The large body of observations on stature, weight, and complexi collected by Dr. Beddoe, and those on stature, weight, and chest-gi collected by Mr. Roberts, previously to the formation of the Committ have been made use of; and the Committee has thus had observatic made on a total number of about 53,000 individuals of both sexes and all ages, from which to construct their tables and to base their conclusio

9. The statistics are unique in range and numbers, and have be obtained from a very large number of independent observers living different parts of the country, without prejudice, and often in ignorance the use which would be made of them; and they have been analysed a tabulated in a perfectly impartial manner, irrespective of all preconceiv opinions. The Committee does not claim for them exemption from t liability to that amount of imperfection and probable error which m attach to all conclusions drawn from a disproportionate, and from comparatively small number of observations. But great care has be taken in the examination and classification of all the returns to elimin obvious errors, and to call attention in the body of the Report to a apparent discrepancies from faulty observation or deficient numbers.[1]

[1] 'If an exceedingly large number of measurements, weights, &c. be taken—s posing no bias, or any cause of error acting preferably in any one direction to e —not only will the number of small errors vastly exceed that of large ones, but results will be found to group themselves about the mean of the whole always acco ing to one invariable law of numbers, and *that* the more precisely, the greater *total number* of determinations. . . . . Rude and unskilful measurements of *kind, accumulated* in very great numbers, are competent to afford precise m *results.* The only conditions are the continual *animus mensurandi*, the absence

Methods.

10. The forms and instruments used have been explained in the Reports for 1878 and 1880; but practical difficulties have been found to exist in obtaining trustworthy observations with regard to breathing capacity. Experience has also led the Committee to believe that the use of Snellen's test-types for sight, Nos. 1 and 10, is more convenient, and will yield more trustworthy results, than that of the army test-dots, which were adopted in its original circulars.[1] Since 1879, also, the Committee has introduced the use of cards for recording the observations relating to single persons, which has been extensively adopted in Germany and the United States, and recently by the Investigation Committee of the British Medical Association, and which offers great facilities in analysing and grouping the facts observed. The Committee appends copies of the forms of the cards and of the methods of measurement and observation which they have employed. (See Appendix A.)

11. The difference between the *average* and *mean* of a number of observations, and its importance in dealing with the subjects under consideration, has been pointed out and discussed by Mr. Roberts in the Report for 1881, at p. 233;[2] and the special sense in which Mr. Roberts employs the term *mean*, being that value in an arithmetic series of observed values of which the observations are the most frequent, has been adopted by the Committee.[3]

12. In connection with the question of the applicability of the exponential law of error to statistical results relating to anthropometry, Mr. Francis Galton has contributed a valuable series of tables, with remarks, on the range in height, weight, and strength, in which he introduces his method of the calculation of deciles, quartiles, and medians.[4]

bias, the correctness of the scale with which the measures are compared, and the assurance that we have the entire range of error, at least in one direction, within the record.'—Sir J. F. W. Herschel, *Edin. Rev.* vol. xcii.

[1] See the Report for 1881 for a discussion of this subject by Mr. Lawson and Mr. Roberts.

[2] Also in a note at p. 121 of the Report for 1880.

[3] Mr. Roberts has followed Quetelet in the use of the word *mean*, and its difference from an *average* is thus explained by Sir John Herschel. Speaking of Quetelet's *homme moyen* he says:—'Now, this result, be it observed, is a *mean* as distinguished from an *average*. The distinction is one of much importance, and is very properly insisted on by M. Quetelet, who proposes to use the word mean only for the former, and to speak of the latter (average) as the "arithmetical mean." . . . . An average may exist of the most different objects, as of the height of houses in a town, or the size of books in a library. It may be convenient to convey a general notion of the things averaged, but involves no conception of a natural and recognised central magnitude, all differences from which ought to be regarded as deviations from a standard. The notion of a mean, on the other hand, does imply such a conception, standing distinguished from an average by this very feature, viz., *the regular march of the groups, increasing to a maximum and then again diminishing*. An average gives us no assurance that the future will be like the past. A mean may be reckoned on with the most implicit confidence. All the philosophical value of statistical results depends on a due appreciation of this distinction, and acceptance of its consequences.'—*Edin. Rev.* vol. xcii. Mr. Galton, however, desires to state that considering many statistical groups which are regular in their distribution are at the same time normally asymmetrical, he does not recognise the expressions of 'mean value' and 'the value most likely to be observed' as strictly equivalent.

[4] Report for 1881, p. 245.

TABLE I.—Showing the STATURE, WEIGHT, CHEST-GIRTH, and STRENGTH Kingdom, arranged accord

STATURE																	
eight without shoes		Scotland		Ireland		England		Wales		Total		Weight with clothes		Scotl			
ches	Mètres	No. of observations	No. per 1,000	No. of observations	No. per 1,000	No. of observations	No. per 1,000	No. of observations	No. per 1,000	No. of observations	No. per 1,000	lbs.	kilos.	No. of observations			
77–	1·957	1	1	—	—	1	—	—	—	2	—	280	127·3	—			
76–	1·931	4	3	—	—	1	—	—	—	5	1	270	122·7	—			
75–	1·906	6	4	—	—	9	2	1	1	16	2	260	118·2	—			
74–	1·881	15	12	—	—	16	2	1	1	32	3	250	113·6	4			
73–	1·855	26	20	3	8	48	8	2	3	79	9	240	109·1	2			
72–	1·830	69	53	10	29	117	19	6	8	202	24	230	104·5	4			
71–	1·804	102	78	15	44	254	41	21	28	392	46	220	100·0	7			
70–	1·779	115	88	25	72	473	76	33	45	646	75	210	95·5	14			
69–	1·754	218	167	40	116	753	122	52	70	1063	124	200	90·9	24			
68–	1·728	210	161	62	179	886	143	72	97	1230	143	190	86·4	67			
67–	1·702	210	161	73	211	918	148	128	173	1329	155	180	81·8	125			
66–	1·677	139	107	58	167	881	142	145	196	1223	143	170	77·3	168			
65–	1·653	109	84	33	96	740	119	108	146	990	115	160	72·7	275			
64–	1·626	47	36	15	44	524	85	83	112	669	78	150	68·2	255			
63–	1·601	19	14	7	20	320	52	48	65	394	46	140	63·6	173			
62–	1·575	9	7	2	6	128	20	30	41	169	20	130	59·1	63			
61–	1·550	2	2	2	5	70	12	9	12	83	9	120	54·5	22			
60–	1·525	2	1	—	—	39	6	—	—	41	5	110	50·0	8			
59–	1·499	—	—	1	3	12	2	1	1	14	1	100	45·5	1			
58–	1·474	1	1	—	—	3	1	—	—	4	1	90	40·9	—			
57–	1·448	—	—	—	—	1	—	1	1	2	—	—	—	—			
tal . .		1304	1000	346	1000	6194	1000	741	1000	8585	1000	Total . .		1212			
erage inches		68·71	—	67·90	—	67·36	—	66·66	—	67·66	—	Average lbs.		165·3			
,, mètres		1·746	—	1·726	—	1·712	—	1·694	—	1·720	—	,, kilos.		75·1			
an inches . .		68·5	—	67 5	—	67·5	—	66·5	—	67·5	—	Mean lbs. .		160·0			
, mètres . .		1·741	—	1·715	—	1·715	—	1·690	—	1·715	—	,, kilos. .		72·7			
ight÷weight nches per lb. of weight)		·416	—	·441	—	·435	—	·421	—	·428	—	Weight÷hgt. (lbs. per in. of height)		2·406			

NOTE.—The factors in the bottom line give some means of ascertaining the most probable stature, weight, chest-girth, or strength of a man, when only one of these data is known. They also give modified values when the birthplace of the man is also known, whether it be in Scotland, Ireland, England, or Wales. The results so obtained are based on the supposition that the proportion between the values of these qualities is constant, which is practically *true for* values that do not differ widely from the mean.

The method of employing the factors is simple: thus, the first five of *them are the number of* inches in height divided by the number of pounds in

8585 Adult Males (age from 23 to 50) of the Population of the United Kingdom. Place of Birth.

WEIGHT								CHEST-GIRTH				STRENGT		
Wales		England		Ireland		Total		Empty chest-girth: military measurement		Total: chiefly English		Strength: drawing-power, as in drawing a bow		Tot
No. of observations	No. per 1,000	No. of observations	No. per 1,000	No. of observations	No. per 1,000	No. of observations	No. per 1,000	Inches	Centimètres	No. of observations	No. per 1,000	lbs.	kilos.	No. of
1	1	—	—	—	—	1	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	45-	114·3	4	1	—	—	—
—	—	1	—	—	—	1	—	44-	111·7	7	2	—	—	—
1	1	3	1	—	—	8	1	43-	109·2	20	6	—	—	—
—	—	9	2	—	—	11	2	42-	106·6	57	17	—	—	—
2	3	10	2	—	—	16	2	41-	104·1	76	22	150	68·2	
1	2	33	6	—	—	41	5	40-	101·6	128	35	140	63·6	
8	11	62	11	1	4	85	11	39-	99·0	216	63	130	59·1	
7	9	75	13	1	4	107	14	38-	96·5	330	97	120	54·5	1
14	19	174	31	8	32	263	34	37-	93·9	442	130	110	50·0	1
34	46	304	55	13	53	476	61	36-	91·4	588	173	100	45·5	7
102	138	492	89	25	101	787	102	35-	88·9	552	162	90	40·9	22
134	182	881	158	36	146	1326	171	34-	86·3	541	158	80	36·4	29
178	242	1075	194	51	206	1559	201	33-	83·8	249	75	70	31·8	52
153	207	1240	223	57	231	1623	210	32-	81·2	117	35	60	27·3	25
68	92	694	125	42	170	867	112	31-	78·7	40	12	50	22·7	6
23	31	338	61	7	29	390	50	30-	76·2	33	10	40	18·2	1
10	13	133	24	1	4	152	20	29-	73·6	5	2	30	13·6	
2	3	26	5	5	20	34	4	28-	71·1	1	—	—	—	—
—	—	2	—	—	—	2	—	27-	68·5	1	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
738	1000	5552	1000	247	1000	7749	1000	Total . .		3407	1000	Total . .		149
158·3	—	155·0	—	154·1	—	158·2	—	Average ins. .		36·46	—	Average lbs.		79·
71·9	—	70·5	—	70·0	—	71·9	—	,, cm. .		92·6	—	,, kilos.		36·
155·0	—	150·0	—	150·0	—	155·0	—	Mean inches .		36·50	—	Mean lbs. .		77·
70·5	—	68·2	—	68·2	—	70·5	—	,, cm. .		92·7	—	,, kilos. .		35·
2·323	—	2·301	—	2·270	—	2·323	—	Girth÷hgt.		·542	—	Stngth.÷ht.		1·18
								Girth÷wgt.		·235		Stngth.÷wt.		·51

weight, in the five following cases, natives of Scotland, Ireland, England and Wales, and in the British Isles generally. The factor for Scotland 0·416, consequently a Scotchman whose weight is 150 lbs. has most probably a height of 150 × 0·416 inches, or 62·4 inches. Similarly, in the next group of pounds of weight divided by inches of height, the factor for Englishmen is 2·301, consequently an Englishman 66 inches in height should weigh 66 × 2·301 lbs., or 152 lbs. In the same way we may calculate the other elements by the remaining factors.

Summary of Information Obtained.

13. The Committee submit in this, its final Report, a review of all the information which it has collected under the different heads of inquiry, giving references to those tables and conclusions which have been published in its previous Reports, and adding such others as it has been able to draw from the several sources at its command.

14. The first object of the Committee has been to ascertain the principal characteristics of the adult population:—

a. As to the stature, weight, chest-girth, and strength of the whole country and of each of its four provinces, shown in Table I., pages 256, 257.

b. The relative stature, weight, and strength of men and women. Table II., page 261.

c. The stature, weight, and complexion (colour of eyes and hair) of men in different counties as indicating their racial origin, and the influence of soil, climate, occupation, and other sanitary surroundings. Tables III. and IV., and Plates V.–IX., pages 262 to 265.

d. The relative stature of men of British origin, and that of other nationalities and races as far as they have been ascertained. Tables V. and VI., pages 268, 269.

15. The second object the Committee has had in view has been to ascertain the rate of growth and development of children of both sexes under different conditions of life (*media*); the period of the attainment of maturity; and the influence of advancing age on the physical condition of the body. Tables XII. to XXV.

Adult Population of the British Isles.

a. Adult Males—Table I.

16. Table I. shows the stature, weight, chest-girth, and strength of adult males of the ages from twenty-three to fifty years, the number of men at each measurement, and the ratio per thousand of the male population.

17. The observations are grouped according to the place of birth in England, Wales, Scotland, and Ireland; and, with the exception of the Irish, they were chiefly derived from the division of the country under which they are entered in the table. The Irish returns are almost entirely those of men born in Ireland, but living in England, Scotland, or Wales; and the Committee regrets that it has not been able to obtain more than one return direct from Ireland. The Scotch and Welsh by birth, living in England, have been entered under their respective nationalities. The columns are arranged in the order of the superiority of the average stature and weight.

18. The general results indicated by this table may be summarised as follows:—In height the Scotch stand first (68·71 inches; 1·746 mètres), the Irish second (67·90 inches; 1·726 mètres), the English third (67·36 inches; 1·712 mètres), and the Welsh last (66·66 inches; 1·694 mètres), the average of the whole being 67·66 inches (1·720 mètres). In weight the Scotch take the first place (165·3 lbs.; 75·1 kilos.), the Welsh the second (158·3 lbs.; 71·9 kilos.), the English the third (155·0 lbs.; 70·5 kilos.), and the Irish the fourth (154·1 lbs.; 70·0 kilos.), *the average weight* of the whole being 158·2 lbs. (71·9 kilos.). Thus the *Scotch are the tallest* and heaviest, the English take the third place in *both tables, while the* position of the Welsh and Irish is reversed—the

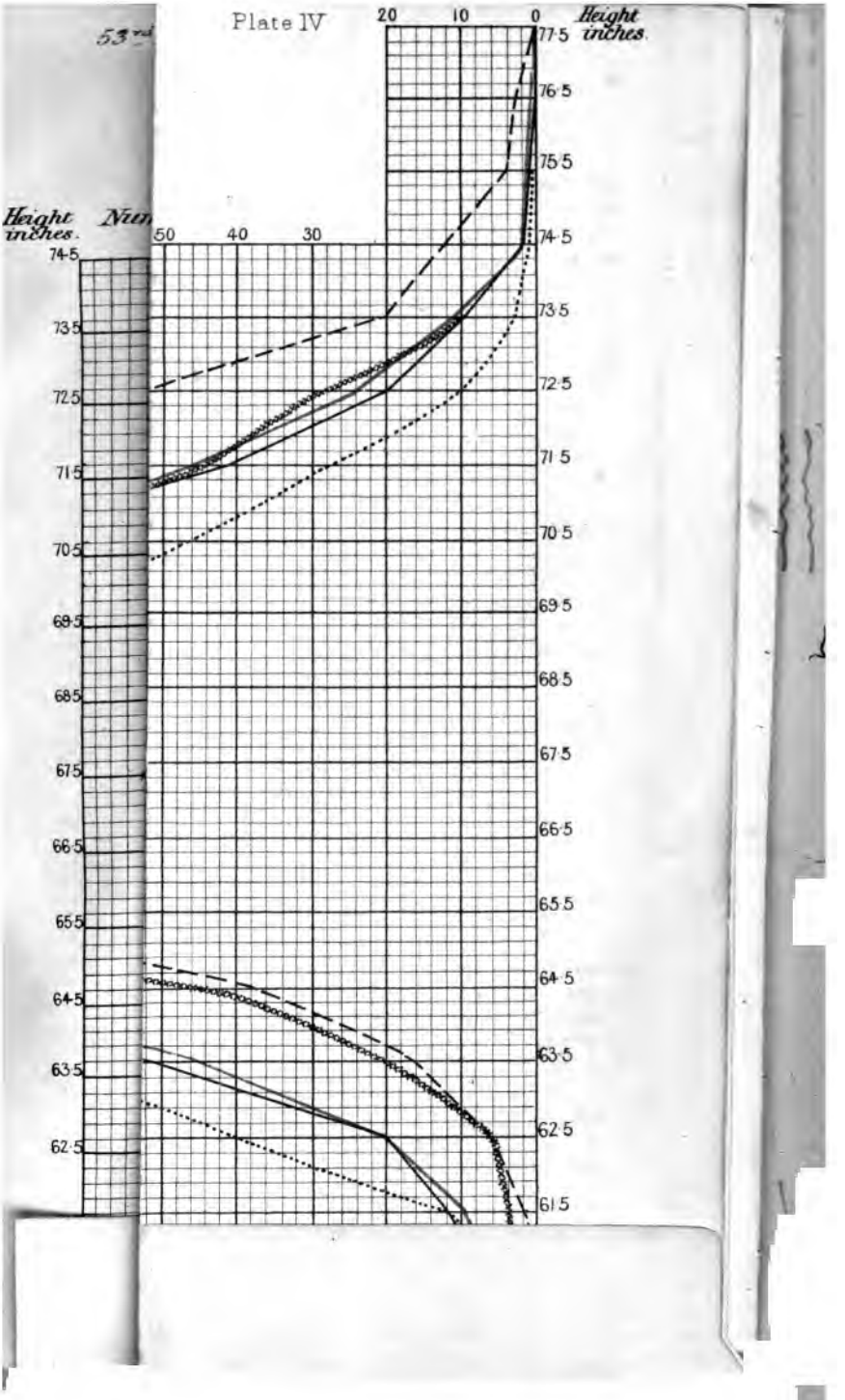
Plate IV
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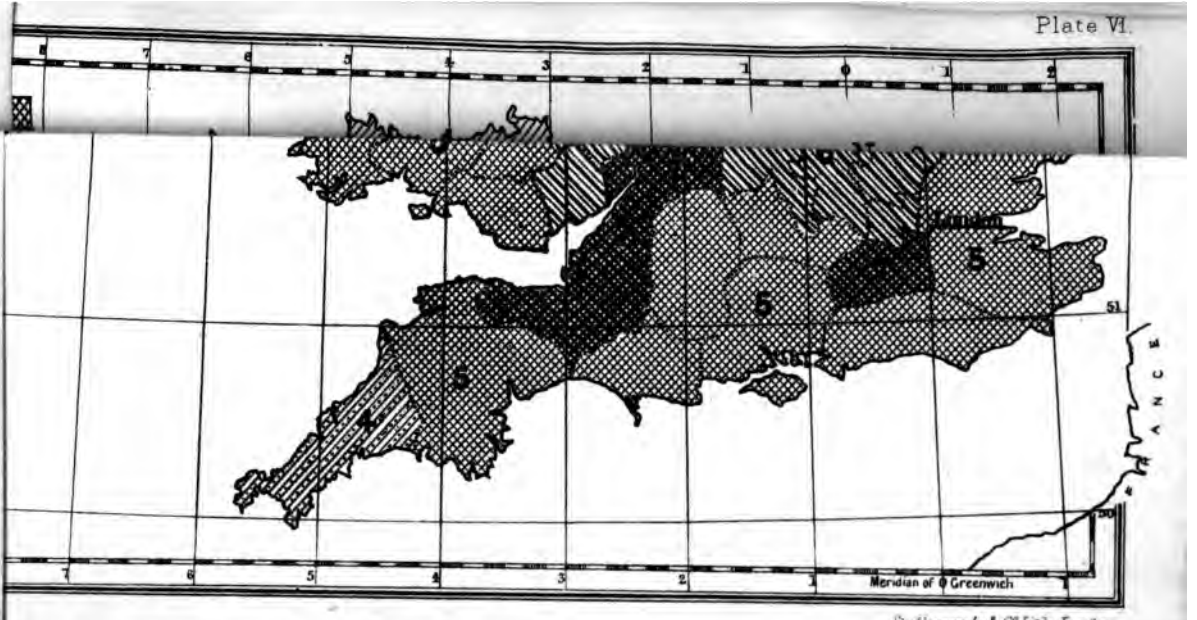

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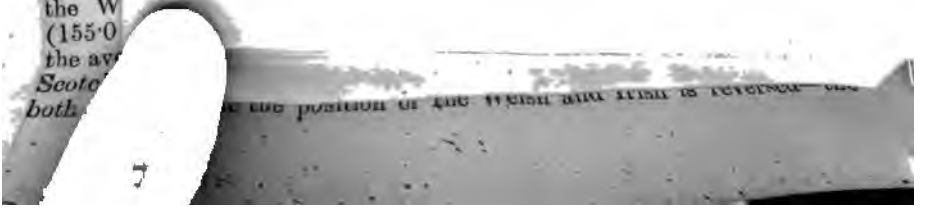

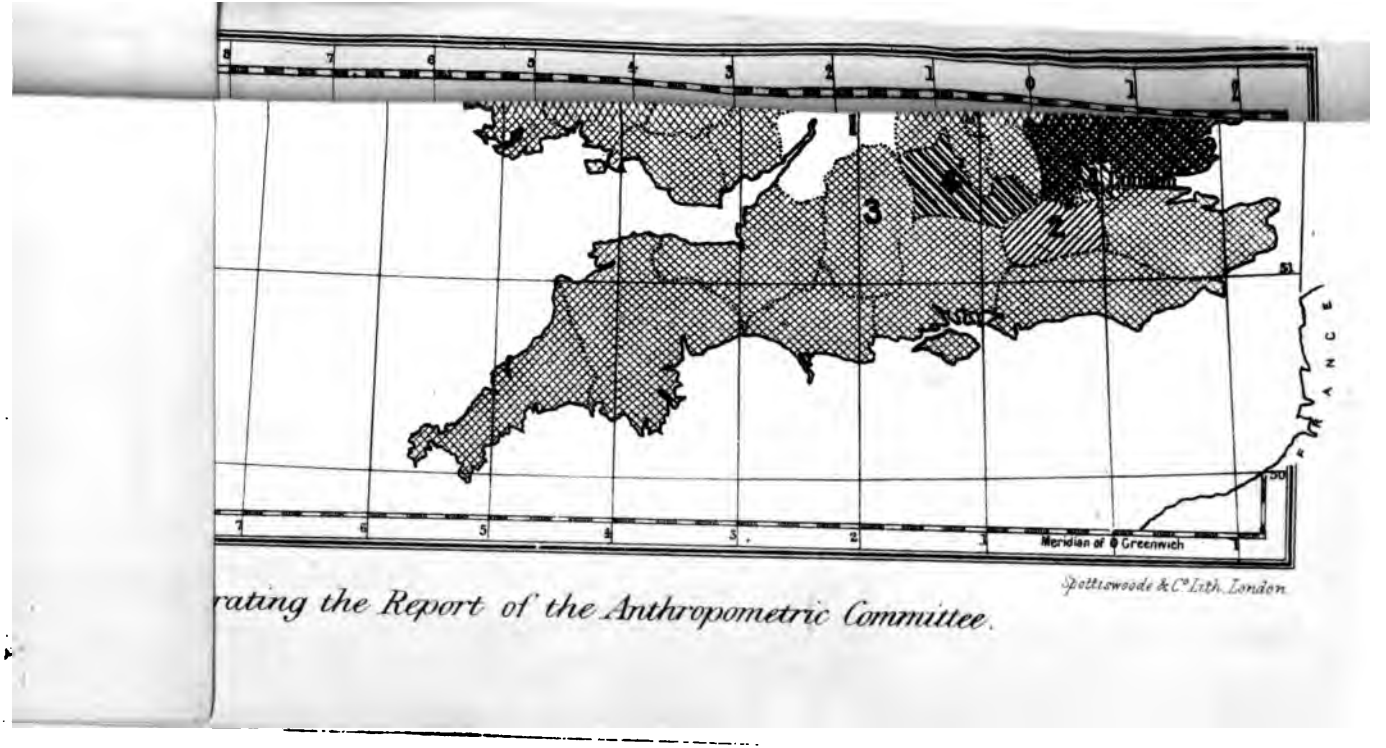

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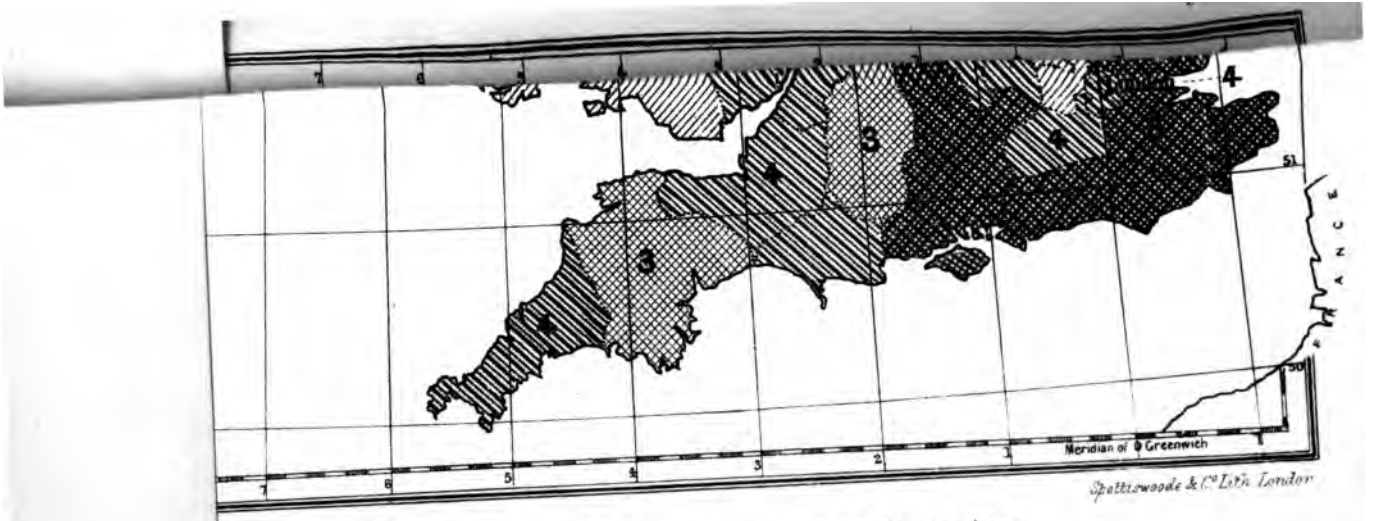

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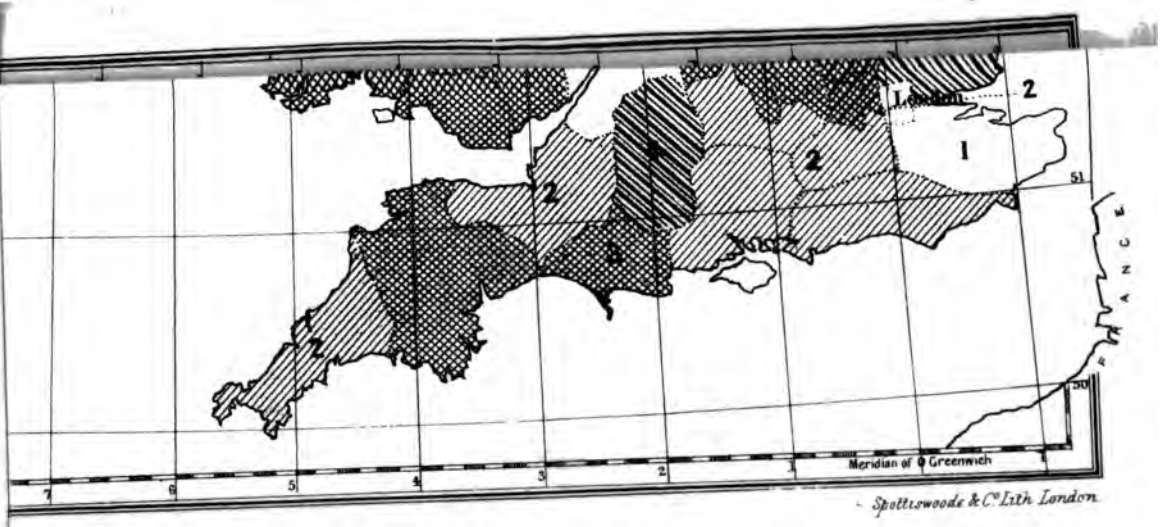

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h, occupying the second place in stature, come last in weight, and Welsh, though lowest in stature, stand second in weight. For each h of stature a Scotchman weighs 2·406 lbs., a Welshman 2·375 lbs., Englishman 2·301 lbs., and an Irishman 2·270 lbs.

19. The columns showing the number of individuals per thousand at h height, besides showing in a uniform manner the relative stature . weight of the different nationalities, will be useful to military surns for determining the minimum stature of recruits for the army. ım the run of the figures it is obvious that if each country has to tribute its relative quota of soldiers, the minimum standard for Welsh ruits should be two inches lower, and for English and Irish recruits inch lower, than for Scotch recruits. This difference in the relative ure is best shown by the black line running across the table, which rks the *mean* height—that is to say, the height at which the greatest nber of observations occur in each nationality.

20. It is probable that too much importance has been attached to ure in selecting recruits for the army in this country, and that a h standard does not necessarily produce men best fitted for military ies. In the Report for 1879 are given two tables of the stature and ght of the English, Scotch, and Irish recruits for the years 1862–3, en the minimum standard of height was 66 inches (1·677 mètres), and 1864–65, when it was reduced to 65 inches (1·626 mètres); and the ılt of this change was to lower the general average stature of English ruits by only 0·17 inch, of the Scotch by 0·21 inch, and the Irish by 5 inch, but in all three nationalities to increase the average weight— English by 1·3 lbs., the Scotch by 6·7 lbs., and the Irish by 0·8 lb.

21. Although the minimum standard was the same for all the ionalities, the influence of race is indicated by the difference in the rage stature of the recruits. The English and Welsh recruits (who re not distinguished from each other) were shorter in stature than the sh by 0·30 inch, and the Scotch by 0·44 of an inch.[1]

22. The measurements of the chest given in Table I. are almost irely those of Englishmen, and must be studied in connection with the glish observations of height and weight; and the same remark applies the figures relative to strength. The chest-girths were taken by the thod adopted in the British army, and the strengths by the spring- ance introduced by this Committee, and described in Appendix A.

23. An examination of Table I. shows that an adult Englishman of ical proportions has a stature of 5 feet 7½ inches; a chest-girth of ½ inches; a weight of 10 stones 10 lbs.; and is able to draw, as in wing a bow, a weight of 77½ pounds. These are the mean propor- ns. The averages give greater weight for height; they are:—Height, eet 7⅓ inches; weight, 11 stones 1 lb.; empty chest-girth, 36·46 inches; l strength, 79·6 lbs. For every variation of an inch in stature above below the average, 2·301 lbs. weight, ·542 inch chest-girth, and 82 lbs. strength must be added or subtracted to keep up the typical portions. This rule of proportion is, however, only approximately rect, as variations in the stature depend largely on the length of the er limbs, while the other qualities depend chiefly on the size of the nk. In ascending the scale of height, therefore, the above figures are bably a little too great, while in the opposite direction they are barely ficient, but in either case they are sufficiently near for all practical

[1] Further tables relating to recruits are given in Appendix B to this Report.

purposes.[1] A further development of this rule as applicable to both sexes and at all ages will be found in Table XX.

24. Plate IV. shows the relative stature of the four British nationalities, traced from the columns in the table showing the number of men at each height per thousand. The curve of the English very nearly corresponds with that of the average for the whole kingdom. The Scotch curve is above the average, and from its irregularity it is evident that the observations on which it is based are not quite representative of that part of the kingdom. The Welsh curve is below the general average, and in a manner balances the excess of the Scotch, while the Irish curve is somewhat too acute, owing to the comparatively small number of observations on which it is based.

b. Adult Males and Females—Table II.

25. Table II. shows the relative stature, weight, and strength of adult males and females in England, no returns for females having been received from other parts of the kingdom. The average stature of adult males is 67·36 inches (1·712 mètres), and of females, 62·65 inches (1·592 mètres), showing a difference of 4·71 inches (·120 mètres), or nearly 4¾ inches. The average weight of males is 155·0 lbs. (70·5 kilos.), and that of females 122·8 lbs. (55·8 kilos.), showing an excess of 32·2 lbs. (14·7 kilos.), or about 2⅓ stones on the side of males, the percentage difference of weight being just threefold that of height. The ratio between the stature of men and women in England is as 1 to 0·930, or as 16 to 14·88, the difference being somewhat greater than in Belgium, where, according to Quetelet, the ratio is as 1 to 0·937, or about 16 to 15 (strictly 16 to 14·99). The observations of the strength of females were obtained from pupils in training institutions for schoolmistresses and from shop assistants, and the average is no doubt much lower than if the labouring classes were also represented. The difference of strength is 35 lbs., the females being little more than half as strong as males. In these tables, the age of the attainment of maturity is fixed at 23 years for males, and 20 years for females, the reasons for which will be explained in another part of the Report.

[1]. The following measurements show the difference between the height of the body of men in the standing and recumbent positions, and the span of arms measured across the front of the chest. Also the difference between the height of the body in the standing and the sitting positions, showing the relative length of the trunk and of the lower limbs. The English figures are calculated from the American measurements of Dr. Hitchcock, taken in 1882.

	Age years	No. of obs.		Standing height	Horizontal length	Span of arms	Sitting height	
American Amherst College	21·5	327	mètres	1·729	1·748	1·787	0·907	Length of trunk and head
			inches	68·07	68 82	70·36	35·71	
English Professional class	21·5	364	mètres	1·746	1·765	1·804	·915	
			inches	68·70	69·45	71·01	36·04	
Difference	American		mètres	—	+·019	+·058	−·822	Length of lower limbs
			inches	—	+·75	+2·29	−32·36	
	English		mètres	+·017	+·019	+·058	−·831	
			inches	+·63	+·75	+2·31	−32·66	

The ratio between the total height and the sitting height is 1 to 1·906.

TABLE II.—Showing the Relative STATURE, WEIGHT, and STRENGTH of Adult Males (23–50 years) and Females (20–50 years) of English Origin.

Height				Weight				Strength			
Height without shoes		Number of observations		Weight with clothes		Number of observations		Strength, drawing-power		Number of observations	
inches	Mètres	Males	Females	lbs.	Kilos.	Males	Females	lbs.	Kilos.	Males	Females
7–	1·957	1	—	260	118·2	1	—	—	—	—	—
6–	1·931	1	—	250	113·6	3	—	—	—	—	—
5–	1·906	9	—	240	109·1	9	—	—	—	—	—
4–	1·881	16	—	230	104·5	10	—	150	68·2	4	—
3–	1·855	48	—	220	100·0	33	—	140	63·6	4	—
2–	1·830	117	—	210	95·5	62	—	130	59·1	2	—
1–	1·804	254	1	200	90·9	75	1	120	54·5	15	—
0–	1·779	473	—	190	86·4	174	—	110	50·0	18	—
9–	1·754	753	—	180	81 8	304	1	100	45·5	73	—
8–	1·728	886	3	170	77·3	492	—	90	40·9	226	1
7–	1·702	918	11	160	72·7	881	2	80	36·4	296	—
6–	1·677	881	22	150	68·2	1075	14	70	31·8	522	2
5–	1·653	740	24	140	63·6	1240	20	60	27·3	250	5
4–	1·626	524	44	130	59 1	694	58	50	22·7	69	25
3–	1·601	320	57	120	54·5	338	101	40	18·2	15	101
2–	1·575	128	71	110	50·0	133	108	30	13·6	3	98
1–	1·550	70	59	100	45·5	26	53	20	9·1	—	9
0–	1·525	39	37	90	40 9	2	10	—	—	—	—
9–	1·499	12	22	—	—	—	—	—	—	—	—
8–	1·474	3	17	—	—	—	—	—	—	—	—
7–	1·448	1	6	—	—	—	—	—	—	—	—
6–	1·423	—	3	—	—	—	—	—	—	—	—
5–	1·398	—	2	—	—	—	—	—	—	—	—
Total number of observations		6194	379	—		5552	368	—		1497	241
Average	inches	67·36	62·65	Average	lbs.	155·0	122·8	Average	lbs.	79·6	44·5
	mètres	1·712	1·592		kilos	70·5	55·8		kilos	36·2	20·2
Mean	inches	67·50	62·5	Mean	lbs.	150·0	120·0	Mean	lbs.	77·5	40·0
	mètres	1·715	1·588		kilos	68·2	54·6		kilos	35·2	18·2

Mean

c. Distribution of Adult Males according to Stature, Weight, and Complexion. Table III., and Plates V.–IX. (Maps Nos. 1 to 5).

26. Table III. exhibits the average stature, weight, and complexion (colour of eyes and hair) of adult males born in the several counties of Great Britain and Wales and in each province of Ireland, arranged in the order of the greatest stature. The Committee is sensible that the number of observations in some of the counties is not sufficient to furnish an average which may be fully relied upon; but the results, as detailed in the remarks upon this summary, show that there is such a consistency between the data and the records of history as to justify a general trust in the conclusions to be drawn from the figures.

TABLE III.—Showing the STATURE, WEIGHT, and COMPLEXION of 8,614 Adult Males (age from 23 to 50) of the Population of the United Kingdom, arranged according to birthplace in Counties in the order of greatest Stature. Illustrated by Maps.

Counties	Number of obs.	Average height without shoes		Average weight, including clothes		Ratio, lbs. weight per inch of stature Weight ÷ Height	Light blue, blue, dark blue, and grey eyes, with			Total Fair eyes	Brown, hazel, or black eyes, with			Total Dark eyes	Other combinations, such as green, light brown eyes with light or dark hair
		Inches	Mètres	lbs.	Kilos		Very fair, light brown, or brown hair	Black or dark brown hair	Golden or red hair		Brown, dark brown, and black hair	Fair hair	Red and dark red hair		
							per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
SCOTLAND. Total .	1369	68·71	1·746	165·8	75·1	2·406	46·1	24·9	4·2	75·2	22·0	0·9	1·1	24·0	0·8
Kirkcudbright, Ayrshire, and Wigton	124	70·14	1·782	172·9	78·6	2·465	48·4	25·6	3·3	72·3	27·0	—	—	27·0	0·7
Edinburgh, Linlithgow, Haddington, and Berwickshire	60	69·60	1·769	178·6	81·2	2·551	51·5	25·8	1·0	78·3	15·5	—	3·1	18·6	3·1
Perth, Stirling, and Dumbarton .	46	69·13	1·757	172·9	78·5	2·501	40·9	22·0	7·1	70·0	26·0	—	3·2	29·2	0·8
Sutherland, Ross, Cromarty, and Skye	63	68·76	1·747	169·8	77·2	2·469	45·2	26·0	2·9	74·1	23·1	1·9	0·9	25·9	—
Fife, Kinross, and Clackmannan .	82	68·65	1·745	162·7	73·9	2·370	38·4	28·8	4·1	71·3	23·3	4·1	1·3	28·7	—
Argyle, Bute, and Arran . . .	97	68·63	1·744	177·0	80·4	2·579	42·9	22·1	5·7	70·8	24·3	0·7	2·1	27·1	2·1
Dumfries, Roxburgh, Selkirk, and Peebles	113	68·59	1·741	161·6	73·4	2·356	43·0	32·4	5·6	81·0	17·6	—	0·7	18·3	0·7
Inverness-shire	88	68·45	1·740	166·3	75·5	2·429	44·2	26·6	3·2	74·0	24·7	1·3	—	26·0	—
Lanark and Renfrew (including Glasgow)	189	68·21	1·734	151·4	68·8	2·219	52·8	17·6	3·2	73·6	24·6	0·4	1·0	26·0	0·4
Caithness	39	68·22	1·734	168·1	76·4	2·464	37·5	27·5	7·5	72·5	17·5	2·5	2·5	22·5	5·0
Forfar and Kincardine . . .	65	68·07	1·728	159·9	72·7	2·349	51·7	29·3	2·6	83·6	14·6	0·9	—	15·5	0·9
Bay and Colonsay . . .	109	68·04	1·728	171·3	77·8	2·517	38·0	43·4	9·7	91·1	8·0	0·9	—	8·9	—
Aberdeen, Banff, Elgin, and Nairn	109	68·04	1·728	165·9	75·4	2·438	40·1	24·0	2·1	66·2	28·9	2·1	1·4	32·4	1·4
Shetland	108	67·92	1·726	155·9	70·8	2·295	62·4	11·1	4·3	77·8	21·4	0·8	—	22·2	—
Hebrides—Harris and Uist . . .	77	67·91	1·726	169·1	76·8	2·490	—	—	—	—	—	—	—	—	—
ENGLAND. Total	6194	67·36	1·712	155·0	70·5	2·301	40·4	19·6	3·1	63·1	31·5	1·6	0·6	33·7	3·2
Yorkshire, North and East Ridings .	231	69 00	1·754	164·0	74·5	2·377	40·5	20·5	5·6	66·6	23·8	2·9	0·3	27·0	6·4
Northumberland	291	68·59	1·743	161·4	73·3	2·353	43·2	23·8	7·3	74·3	20·5	0·8	0·4	21·7	4·0
Cumberland and Westmoreland . .	272	68·37	1·737	158·6	72·1	2·320	41·4	25·2	1·1	67·8	28·9		0·4		

Berkshire	92	67·66	1·718	100·2	71·0	2·000	39·9	14·1	1·1	57·1	38·5	1·1	—	39·6		3·8
Kent	228	67·62	1·718	157·1	71·4	2·828	41·9	14·1	1·1	57·1	38·5	1·1	1·0	39·6		3·8
Lancashire	243	67·50	1·715	151·7	68·9	2·247	40·8	16·4	1·8	64·0	32·9	0·8	0·8	34·7		1·8
Hampshire	166	67·45	1·714	155·2	70·5	2·301	40·2	15·7	1·2	57·1	37·4	0·8	0·8	39·0		3·9
Nottinghamshire	156	67·38	1·712	158·9	69·9	2·284	44·6	17·5	2·6	64·7	32·8	1·0	1·0	34·8		0·5
Leicester and Rutland	90	67·29	1·709	155·8	70·6	2·808	34·4	16·8	—	50·7	44·4	1·2	0·6	46·2		3·1
Northamptonshire	136	67·26	1·709	156·1	71·0	2·821	40·7	20·7	2·6	64·0	29·4	3·8	—	32·7		3·8
Sussex	147	67·26	1·709	159·5	72·5	2·871	34·8	18·5	6·2	59·5	35·7	0·9	—	36·6		3·9
Worcestershire	65	67·22	1·708	157·6	71·6	2·844	33·1	18·5	3·2	54·8	43·6	—	—	43·6		1·6
Warwickshire	123	67·12	1·707	149·1	67·7	2·222	37·5	17·7	2·1	57·3	37·6	2·8	0·7	41·3		1·4
Bedfordshire	75	67·07	1·704	157·9	71·8	2·834	35·6	18·7	2·8	52·1	43·6	—	—	43·8		4·1
Devonshire	218	67·08	1·704	156·9	71·2	2·839	43·0	20·0	2·8	65·8	28·6	3·2	0·5	32·5		1·7
Dorsetshire	73	67·00	1·702	158·1	71·8	2·860	35·3	23·0	1·6	59·9	32·8	1·6	0·8	35·2		4·9
Yorkshire, West Riding (including Sheffield)	453	66·98	1·702	152·6	69·8	2·278	42·1	19·2	6·4	67·7	29·6	1·5	0·2	31·3		1·0
London	259	66·92	1·701	152·9	69·5	2·285	36·3	17·2	2·4	55·9	32·3	0·5	2·0	34·8		9·5
Cambridge and Huntingdonshire	122	66·75	1·696	155·3	70·6	2·825	39·9	11·2	2·8	53 9	44·7	—	0·7	45·4		0·7
Oxfordshire and Buckingham	72	66·74	1·696	151·8	69·0	2·275	40·8	21·7	0·8	63·8	34·2	0·8	—	35·0		1·7
Cheshire	37	66·60	1·690	150·9	68·6	2·269	48·2	18·0	5·0	66·2	30·2	—	0·7	30·9		2·8
Surrey (exclusive of London)	270	66·47	1·685	146·5	66·6	2·204	45·4	19·8	1·8	67·0	30·1	1·0	0·3	31·4		1·6
Hereford and Monmouth	23	66·45	1·688	154·0	70·0	2·817	41·7	22·8	1·0	65·0	29·1	1·0	1·0	31·1		3·9
Wiltshire	141	66·34	1·686	158·2	71·9	2·864	42·8	26·2	0·9	69·9	28·4	—	0·4	28·8		1·3
Shropshire	60	66·33	1·685	149·4	67·9	2·252	40·8	15·7	1·4	57·9	36·7	—	3·4	40·1		2·0
Gloucestershire (including Bristol)	336	66·31	1·685	148·8	67·4	2·236	50·8	14·8	2·2	66·8	30·2	1·4	—	31·6		1·6
Somersetshire	447	66·30	1·685	149·1	67·8	2·249	38·9	17·4	4·9	61·2	30·8	3·4	0·7	34·1		4·4
Hertfordshire and Middlesex (exclusive of London)	160	66·27	1·684	152·5	69·2	2·801	29·0	36·8	2·0	67·3	28·8	0·8	—	24·6		8·1
WALES. Total	735	66·66	1·694	158·3	71·9	2·875	34·4	21·2	8·7	64·3	26·8	4·2	1·1	32·1		8·6
Flint and Denbigh	82	67·06	1·703	160·7	73·1	2·396	29·5	18·9	11·6	60·0	26·8	5·3	—	31·6		8·4
Carnarvon, Anglesea, Merioneth, and Montgomery	82	66·85	1·699	162·5	73·8	2·431	35·9	12·8	5·1	53·8	41·1	—	—	41·1		5·1
Cardigan	389	66·61	1·693	155·9	70·9	2·340	30·9	23·0	13·0	66·9	27·9	3·7	1·5	33·1		—
Brecon and Radnor	60	66·58	1·692	158·2	71·9	2·891	42·0	20·3	1·4	63·7	33·3	—	1·5	34·8		1·5
Glamorgan, Caermarthen, and Pembroke	122	66·47	1·689	155·4	70·6	2·339	39·6	20·8	8·2	68·6	21·2	6·4	0·8	28·4		8·0
IRELAND. Total	346	67·90	1·726	154·1	70·0	2·270	48·1	19·3	2·5	69·9	28·7	0·8	1·1	25·6		4·5
Connaught	35	68·73	1·746	154·9	70·2	2·258	59·0	24·1	1·2	84·3	13·3	—	1·2	14·5		1·2
Munster	55	68·52	1·741	158·0	69·5	2·233	36·8	24·0	4·8	65·6	24·0	0·8	—	24·8		9·6
Ulster	44	68·41	1·739	157·9	71·8	2·308	49·4	24·7	—	74·1	22·2	1·2	—	23·4		2·5
Leinster	143	68·21	1·734	149·4	67·9	2·181	50·3	11·5	7	64·5	28·9	1·1	2·2	32·2		8·8

D 5

27. To save much detailed description, the Committee has thought it desirable to illustrate Table III. by a series of shaded maps (Plates V.–IX.), which present at once to the eye the relative distribution of the stature, weight, and complexion of the adult male population in the several counties of Great Britain and in each province of Ireland.

Map No. 1 shows the distribution of the average stature (without shoes) of adult males, in degrees of half an inch each from 66 to 70 inches. The darkest shade represents the shortest stature.

Map No. 2 shows the distribution of the average weight (including the clothes) of adult males, in degrees of five pounds from 145 pounds to 180 pounds. The darkest shade represents the lightest weight.

Map No. 3 shows the distribution of adult males with fair complexion, i.e. blue and grey eyes with fair, light-brown, brown, and light-red hair. The darkest shade represents the lowest percentage of fair complexion.

Map No. 4 shows the distribution of adult males with dark complexion, i.e. brown and black eyes, with brown, dark brown, dark red, and black hair. The darkest shade represents the highest percentage of dark complexion, or its greatest prevalence.

Map No. 5 shows the distribution of adult males with mixed complexion, i.e. blue and grey eyes with dark brown and black hair. The darkest shade represents the highest percentage, or the greatest prevalence of this complexion.

28. As the observations were necessarily made on a limited number of individuals, and as doubts may exist as to whether the results can be accepted as representing the whole of the male population at the ages specified, the counties having similar statures have been grouped together, and the male population for each group ascertained from the Census returns of 1881.[1] The average stature worked out from these figures is 67·58 inches, while that obtained from the actual observations on 8,585 individuals, given in Table I., is 67·66 inches, the difference between the two being only 0·08 of an inch. Table IV. shows the grouping of the counties, having the same stature according to the Committee's returns, and the total male population of each group at the ages from 25 to 55 years.

[1] These returns for England and Scotland are not yet published, and the Committee is indebted to the courtesy of the Registrars-General of those portions of the kingdom for manuscript copies of the returns. The ages of the men on whom the observations were made are not exactly the same as those obtained from the Census office, but they are sufficiently near for any practical purpose. The measurements were made on men from 23 to 51 years of age, while the Census returns are those of men from 25 to 55 years, but the four years above 51 will about compensate for the two years wanting below 25 years both in numbers and stature, in consequence of losses by death. Both periods correspond with the best portion of men's lives, at least as far as stature is concerned.

TABLE IV.—Showing the Number of Adult Males of the Ages above 25 and under 55 years for each group of counties possessing the same AVERAGE STATURE, and the ratio per 1,000. From the Census returns of 1881.

Observed average stature without shoes in inches	Counties of the United Kingdom	Adult male population age 25-55 years	Per 1,000
69½ and upwards	Kirkcudbright, Ayr, Wigton; Edinburgh, Linlithgow, Haddington, Berwickshire.	125,103	22·2
69 to 69½	Sutherland, Ross and Cromarty, Skye, Perth, Stirling, Dumbarton, Fife, Kinross, Clackmannan; North and East Ridings of Yorkshire.	167,914	30·0
68½ to 69	Argyle, Bute, Arran, Dumfries, Roxburgh, Selkirk, Peebles; Northumberland; Connaught, Munster.	459,055	81·7
68 to 68½	Caithness, Inverness, Aberdeen, Banff, Elgin, Nairn, Forfar, Kincardine; Lanark, Renfrew; Cumberland, Westmoreland; Lincoln, Norfolk; Ulster, Leinster.	974,177	173·4
67½ to 68	Shetland, Western Hebrides; Durham, Lancashire, Derby, Stafford; Suffolk, Essex, Kent; Berkshire; Cornwall.	1,326,292	236·0
67 to 67½	Nottingham, Leicester, Rutland, Northampton, Bedford; Warwick, Worcester; Flint, Denbigh; Sussex, Hampshire, Dorset, Devon.	688,465	122·6
—	London (66·92 inches).	667,118	118·7
66½ to 67	West Riding of Yorkshire, Chester; Carnarvon, Anglesea, Merioneth, Montgomery, Cardigan, Brecon, Radnor; Cambridge, Huntingdon; Buckinghamshire, Oxfordshire.	636,769	113·3
66 to 66½	Hertford, Middlesex (ex. metrop.); Surrey (ex. metrop.); Shropshire, Hereford, Monmouth, Gloucester, Wiltshire, Somerset; Glamorgan, Caermarthen, Pembroke.	573,774	102·1
		5,618,677	1000·

$$\frac{\text{Stature} \times \text{Population}}{\text{Total male population}} = \left\{\begin{array}{l}\text{67·58 inches, average stature of adult males (25-55 years of age) of the United Kingdom.}\end{array}\right.$$

29. *Ethnology.*—The variations in stature, weight, and complexion shown to exist in different districts of the British Isles by the maps, appear to be chiefly due to difference of racial origin, and this influence predominates over all others. 'We have reason to believe, from historical and antiquarian researches, that the ancient Caledonii, the Belgæ and Cimbri, and the Saxons and Frisians, as well as the Danes and Normans, were all people of great stature. On the other hand, the prehistoric (neolithic) race or races in Britain appear to have been of low or moderate stature. Accordingly the higher statures are found in the Pictish or

Cimbro-British districts of Galloway; in the Anglo-Danish ones of North and East Yorkshire, Westmoreland and Lincolnshire, and in Cumberland, whose people are ethnologically intermediate between the two. Lothian and Berwickshire are mainly Anglian, while the Perthshire Highlanders are the most clearly identified as the descendants of the Caledonii. The high position of Norfolk in the list is due to a large admixture of Danish blood on the coast. There is a fringe of moderately high stature all round the coast from Norfolk to Cornwall, while the inland people, retaining more of the ancient British blood, yield lower averages. Middlesex and Hertfordshire, which stand very low, were later and less perfectly colonised by the Anglo-Saxon than the surrounding counties, and nearly the same may be said of the counties around the Severn estuary and the Welsh border. Cornwall stands higher than the surrounding counties, and this is probably due to its having become the refuge of the military class of Southern Britain, in the main of Belgic origin. Flint and Denbigh owe their superiority to the other Welsh counties to the immigration of the Cumbrian and Strathclyde Britons.' —Dr. Beddoe.

30. According to the Committee's returns, the western provinces of Ireland possess a high stature, similar to the Scotch Highlands, with which they may have a common racial origin, while the lower stature of the eastern provinces is probably traceable to the comparatively recent Scotch and English immigrations. The Irish returns are, however, too few to be relied on (although the closeness of the averages for all the provinces would suggest the absence of any errors of observation), and any conclusions drawn from them must be received with great reserve until they are confirmed by more extended inquiries. In some of the returns the county origin and birthplace was not recorded, which accounts for the difference between the totals for the whole of Ireland and those living in each province.

31. The racial elements of the British population are best demonstrated by separating a few of the counties where there has been the least admixture of foreign blood, and comparing these together, thus:—

Race	District	Stature	Weight
Early British .	Cardigan, Radnor, and Brecon . . .	66·59	169·3
Saxon . .	Sussex, Berkshire, and Oxfordshire . .	67·22	155·8
Anglian . .	Lothians, Northumberland, and Norfolk .	68·73	166·7
Scandinavian .	Shetland, Caithness, North and East Yorkshire, and Lincolnshire.	68·32	162·7

32. *Geographical distribution.*—The inhabitants of the more elevated districts possess a greater stature than those of alluvial plains. The counties forming the river valleys of the Severn and Wye, the Thames, the Dee and Mersey, the Clyde, the Trent, and the fen district of Cambridge and Huntingdon, show a lower stature than the surrounding counties inhabited by persons of a similar racial origin.

33. With respect to latitude and climate, the inhabitants of the northern and colder districts possess greater stature than those of the southern and warmer parts of the island; those of the north-eastern and drier regions are taller than those of the south-western and damper climates. A similar disposition of stature has been found to exist in France and Italy, the

inhabitants of both these countries being taller in the northern than in the southern provinces. The same rule applies to the whole of the countries of Europe, in their relation to each other, as will be seen in Table IV., constructed to show the position held by the inhabitants of the British Isles relative to the stature of other European countries. The Committee regrets that it has not been able to obtain any information on this subject direct from the European countries (except some referring to conscripts, which were not suitable for their purpose), and has been obliged to avail itself of the observations made in the United States of America on emigrants from European States. In reading this table it must be borne in mind that the statistics referring to the United Kingdom, collected by the Committee, and to the native-born population of the United States, refer to men of all classes; while those collected by the military authorities of 1863–4 in the United States, referring to Canada and the other American countries, and to those of all Europe, refer to emigrants, who belong almost entirely to the labouring classes. The close accord between the average stature of the United Kingdom (67·66 inches) and that of the native white population of the United States (67·67 inches) is accounted for in this way; and, on the other hand, the marked differences between the statures of the Scotch (68·71), Irish (67·90), English (67·36), and Welsh (66·66 inches), as given by the Committee and those given by the United States Government (67·07, 66·74, 66·58, and 66·42 respectively) is explained. Some American writers on the subject have overlooked this important distinction, and, studying only the statistics obtained in their own country, have concluded that the Anglo-Saxon race is of greater stature in America than in Great Britain. In the Report of the Committee for 1879 Mr. Roberts has given a paper, illustrated by a series of diagrams and statistical tables, of English and Americans, showing the close similarity which exists between the stature and weight of the two branches of our race, both in children and adults; and the more extended observations of the Committee appear to confirm his conclusions.

34. *Occupation and sanitary surroundings.*—The various industries of this country are not often so defined by the county boundaries as to show their effects on the physical development. It is probable, however, that the low stature in the West Riding of Yorkshire is due to the large manufacturing town population included in the returns, and the relatively low stature of Durham to the large mining population. Lancashire and Stafford, which contain similar industries to those of the West Riding and Durham, do not show any falling off in stature, and it is probable that a large number of returns received from Sheffield have unfairly lowered the West Riding. The very low position, lower than can be accounted for by their racial origin, taken by the home counties—Hertford, Middlesex, and Surrey—is no doubt due to their proximity to London; the more vigorous men are attracted to the town by high wages, and the more feeble overflow into the surrounding districts. The counties which fringe the sea-coast possess a higher stature than those adjoining them but lying further inland. This may be due to race, as has already been suggested; but it may also be due to the more healthy situation or the fishing occupation. The lower stature of the river valleys would seem to imply that such situations are not favourable to physical development, especially as some of them were originally settled by the Scandinavian races.

TABLE V.—Showing the Average STATURE of Adult Males in each Division of the United Kingdom, according to the returns collected by the Anthropometric Committee, compared with that of Adult Males of American and European Origin, who were examined for admission into the United States Army in the year 1863–4; the natives of European origin being arranged in the order of their average stature, showing also the medium stature, and the proportions above and below it, with the proportions of the extremes of high and low stature. (See 'Statistics, Medical and Anthropological, U.S. Army, 1875.')

Countries	No. of observations	Average stature. Inches	Percentage proportion of total number			Extremes. Percentage proportion of total number	
			Under 65 inches	65 to 69 inches	Above 69 inches	Under 61 inches	Above 73 inches
Observations of Anthropometric Committee:—							
Scotland	1,304	68·71	5·6	50·2	44·2	0·19	2·13
Ireland	346	67·90	6·7	65·3	28·0	0·32	0·00
England	6,194	67·36	17·8	55·5	26·7	0·93	0·43
Wales	741	66·66	22·8	62·0	15·2	—	—
Total, United Kingdom	8,585	67·66	16·1	55·7	28·2	—	—
Observations on Conscripts in U.S. America:—							
United States.							
White, native born	315,620	67·67	15·3	54·1	30·6	0·53	2·02
Coloured, of all degrees	25,828	66·63	29·6	51·9	18·5	1·79	1·00
Indians, N.A. tribes	121	67·93	14·2	52·0	33·8	—	0·08
Immigrants from—							
Canada (chiefly French)	21,645	67·01	21 8	56·3	21·9	0·74	1·01
Mexico	91	66·11	25·2	51·7	13·1	3·29	1·09
South America	79	65·90	41·7	40·4	17·9	2·13	—
West Indies	580	66·31	28·9	56·4	14·7	0·86	0·34
Europe.							
Norway	2,280	67·47	16·6	57·0	26·4	0·74	1·31
Scotland	3,476	67·07	20·4	58·3	21·3	0·46	1·03
Sweden	1,190	66·90	21·3	59·5	19·2	0·42	0·76
Ireland	30,557	66·74	23·2	60·1	16·7	0·70	0·49
Denmark	383	66·65	25·1	57·7	17·2	0·78	0·26
Holland	989	66·64	26·6	56·3	17·1	1·31	0·50
England	16,196	66·58	25·9	58·3	15·8	1·08	0·56
Hungary	89	66·58	22·5	58·4	19·1	3·37	1·12
Germany	54,944	66·54	27·0	57·0	16·0	1·31	0·51
Wales	1,104	66·42	29·3	53·6	17·1	0·82	0·63
Russia	122	66·39	29·6	54·0	16·4	3·28	0·82
Switzerland	1,302	66·38	29·5	55 7	14·8	1·61	0·44
France	3,243	66·28	30·0	56·5	13·5	1·85	0·57
Poland	171	66·21	32·1	56·7	11·2	1·75	1·17
Italy	339	66·00	37·8	48·9	13·3	2·06	0·29
Spain	148	65·64	43·3	49·3	7·4	2·70	—
Portugal	81	65·43	39·5	56·8	3·7	3·70	—

d. British compared with other Races and Nationalities.

35. Considering the large number of different races included in the British Empire, and the political and commercial relations of its people with nearly every other country, the Committee think it will be interesting and useful to give a table showing the average stature of the different races and nationalities of the world, as far as it has been able to ascertain them from published records. The list is very imperfect, and it is probable that many of the measurements need revision by more extensive observation. No nation is so favourably situated for revising and completing the list as our own; and the Committee hope that the table will be instrumental in promoting further observations of the kind, especially by medical officers in the Navy and Army, and others practising in our numerous colonies and dependencies. It is interesting to find that, with the exception of a few imperfectly-observed South Sea Islanders, and whose actual numbers, if the measurements are correct, are very few, the English professional classes head the long list, and that the Anglo-Saxon race takes the chief place in it among the civilised communities, although it is possible it might stand second to the Scandinavian countries if a fair sample of their population were obtained.

TABLE VI.—Showing the STATURE of Adult Males of the British Isles relative to that of other Races and Nationalities, arranged in the order of greatest Stature.

Race or Nationality		Authority	Mètres	Ft. in.
Polynesians	Samoa . . 1·853	Lapeyrouse .	1·762	5– 9·33
	Tahiti and Pitcairn 1·782	Garnot, Beechey		
	Marquesas . 1·763	Porter, Cook, &c.		
	New Zealand . 1·755	Various . .		
	Polynesians . 1·753	Wilkes, *Narara* .		
	Sandwich . . 1·731	Lesson, Rollin .		
English professional class . . .		Anthropometric Com.	1·757	5– 9·14
Patagonians	1·778	Musters . .	1·754	5– 9·00
	1·730	D'Orbigny . .		
Angamis of the Naga Hills . . .		Woodthorp . .	1·754	5– 9·00
Negroes of the Congo		Topinard . . .	1·752	5– 8·95
Scotch, all classes (recruits, 5 ft. 8·03) .		Anthropometric Com.	1·746	5– 8·71
Amakosa Kaffirs, South Africa . .		Sir A. Smith . .	1·741	5– 8·50
Iroquois Indians		Gold	1·735	5– 8·28
Todas of the Nilghiries		Marshall . . .	1·727	5– 7·95
Negroes of Calabar		Topinard . . .	1·727	5– 7·95
North American Indians . . .		Baxter . . .	1·726	5– 7·93
Irish, all classes (recruits, 5 ft. 8·04) .		Anthropometric Com.	1·725	5– 7·90
United States (whites, all classes) .		Baxter . . .	1·719	5– 7·67
English, all classes (recruits, 5 ft. 7·71)		Anthropometric Com.	1·719	5 - 7·66
Norwegians	. . . . 1·727	Beddoe . .	1·719	5 - 7·66
	immigrants to U.S. 1·717	Baxter . .		
Zulus		Roberts . . .	1·707	5– 7·19
English labouring classes . . .		Anthropometric Com.	1·705	5– 7·08
Canadians, chiefly French immigrants, U.S. America		Baxter . . .	1·703	5– 7·01
Tajiks of Ferghana and Samarkand .		Ujfalvy . . .	1·705	5– 7·10
Swedes, immigrants to U.S. America .		Baxter and Beddoe .	1·700	5– 6·90
Chipeway Indians		Oliver . . .	1·700	5– 6·90
Kabyles, large race		Topinard . . .	1·699	5– 6·85

TABLE VI. (*continued*).

Race or Nationality	Authority	Mètres	Ft. in.
Welsh, all classes	Anthropometric Com.	1·695	5– 6·66
Danes, immigrants to U.S. America	Baxter	1·694	5– 6·65
Dutch „ „	Baxter	1·693	5– 6·62
American negroes of all degrees of colour	Baxter	1·693	5– 6·62
English immigrants to U.S. America	Baxter	1·692	5– 6·58
Hungarians „ „	Baxter	1·692	5– 6·58
English Jews	Anthropometric Com.	1·692	5– 6·57
Germans, immigrants to U.S. America	Baxter	1·691	5– 6·54
Swiss of Geneva	Dunant	1·688	5– 6·43
Swiss immigrants to U.S. America	Baxter	1·687	5– 6·38
Russians „ „	Baxter	1·687	5– 6·38
Belgians	Quetelet	1·687	5– 6·38
French immigrants to U.S. America	Baxter	1·683	5– 6·23
Poles „ „	Baxter	1·682	5– 6·20
French upper classes	De Quatrefages	1·681	5– 6·14
Germans	*Novara*	1·680	5– 6·10
Mexicans	Baxter	1·680	5– 6·10
Berbers of Algeria	Topinard	1·680	5– 6·10
Arabs	Various	1·679	5– 6·08
Usbeks of Ferghana and Samarkand	Ujfalvy	1·679	5– 6·08
Javanese	*Novara*	1·679	5– 6·08
Russians	Shultz	1·678	5– 6·04
Italians, immigrants to U.S. America	Baxter	1·677	5– 6·00
South Americans „ „	Baxter	1·675	5– 5·90
Australian Aborigines	Various	1·669	5– 5·68
Austrian Sclaves	*Novara*	1·669	5– 5·68
Galchas, Iranian Mountaineers	Ujfalvy	1·668	5– 5·66
Spaniards, immigrants to U.S. America	Baxter	1·668	5– 5·66
Berbers of Algeria	Topinard	1·666	5– 5·62
Portuguese immigrants to U.S. America	Baxter	1 663	5– 5·43
Ainos	Rosky	1·660	5– 5·33
Austrian Germans	*Novara*	1·658	5– 5·27
French working classes	De Quatrefages	1·657	5– 5·24
Esquimaux of North America	Various	1·654	5– 5·10
Hungarians (military statistics)	Scheiber and Beddoe	1·652	5– 5·04
Caucasians	Shortt	1·650	5– 4·93
New Guinea, various tribes	Various	1·646	5– 4·78
Hindoos	Shortt	1·645	5– 4·76
Bavarians	*Novara*	1·643	5– 4·68
Ruthenians	Majer and Kopernicki	1·640	5– 4·54
Dravidians	Shortt	1·639	5– 4·50
Cingalese	Davy	1·638	5– 4·48
Austrian Roumanians	*Novara*	1·631	5– 4·37
Chinese	*Novara*	1·630	5– 4·17
Italians (conscripts, 1·620)	*An. di Statist.*, 1879	1·626	5– 4·00
Fuegans	*Novara*	1·625	5– 3·98
Polish Jews	Majer and Kopernicki	1·623	5– 3·88
Poles	Majer and Kopernicki	1·622	5– 3·87
Finns (Beddoe, 5 ft. 5·81)	*Novara*	1·617	5– 3·60
Papuans	Various	1·606	5– 3·20
Japanese	Mrs. Ayrton	1·604	5– 3·11
Aymaras Indians, Peru	Forbes	1·601	5– 3·00
Peruvians	D'Orbigny	1·600	5– 3·00
Cochin-Chinese	Finlayson	1·593	5– 2·70
Malays	Raffles, Crawfurd, &c.	1·583	5– 2·34
Veddas of Ceylon	Bailey	1·536	5– 0·42

TABLE VI. (*continued*).

Race or Nationality	Authority	Mètres	Ft. in.
Lapps	Horch	1·500	4– 11·2
Andamanese	Man	1·492	4– 10·7
Aëtas	De Quatrefages	1·482	4– 10·3
Semangs	De Quatrefages	1·448	4– 9·00
Mincopese	De Quatrefages	1·436	4– 8·53
Bosjesmans (Bushmen and S. Africa)	Various	1·341	4– 4·78
Difference between the tallest and shortest races		·421	1– 4·55
Average stature of man according to the above		1·658	5– 5·25

Special Subjects of Inquiry.

36. In the sheet of instructions issued by the Committee observations were asked for to illustrate the physical differences of:—

a. Persons engaged in different occupations.

b. Persons bred and living in towns, or country.

c. Natives of parts of the British Isles differing ethnologically, geologically, or in climate.

d. Boys and men whose intellect and industry are above or below the average.

e. The general characteristics of men noted for athletic power.

f. The rate of growth in persons of both sexes bred in town and country, and engaged in different occupations.

The following table shows some of the extreme variations in stature which occur, and which are associated with different occupations and conditions of life, illustrative of the above subjects of inquiry.

TABLE VII.—Showing the STATURE and WEIGHT of Adult Males (age 23–50 years) under different conditions of life.

	Number	Ft. in.	lbs.
Scotch Agricultural Population, Galloway	75	5 10·5	173·6
Metropolitan Police	192	5 10·1	185·7
Fellows of the Royal Society	98	5 9·76	167.
Yorkshire Fishermen, Flambro'	68	5 8·71	166·8
Athletes (running, jumping, and walking)	89	5 8·34	143·7
Scotch Lead-miners, Wenlockhead	92	5 8·43	163·9
London Fire Brigade	69	5 7·40	160·8
Durham Coal-miners	54	5 6·38	152·4
Edinburgh and Glasgow Town Population	32	5 6·35	137·2
Welsh Lead-miners, Cardigan	328	5 6·30	155·2
Sheffield Town Population	100	5 5·80	142·5
Bristol Town Population	300	5 5·77	142·4
Lunatics, General Population	1,409	5 5·70	147·9
Criminals, General Population	2,315	5 5·60	140·4
Hertfordshire Labourers	174	5 5·35	145·0
Idiots and Imbeciles	19	5 4·87	123·0

37. The influence of town life and town occupations on the physique of the population in districts in which the race differs little, and the climatic

conditions are the same, is seen by comparing the agricultural population of Ayrshire with that of Glasgow and Edinburgh, where the average difference in stature amounts to 4·15 inches, and in weight to 36·4 lbs., in favour of the country folk. A similar, though not so great a difference, exists in Yorkshire, where the fishermen of Flamborough exceed the artisans of Sheffield in stature by 2·81 inches, and in weight by 24·3 lbs. On the other hand, the population of London exceeds that of the adjoining county of Hertfordshire in stature by 1·57 inches, and in weight by 7·9 lbs. Quetelet observed the same condition in Belgium, where the towns showed a higher stature than the country districts; and he concluded that the greater ease and better food attainable in towns were more favourable to physical development than the hard manual labour and poor fare of the agricultural districts. It is probable that Quetelet compared different classes together, or that the towns in Belgium hold an exceptional position, like London to the adjoining districts in England.

38. As an example of the predominance of race over occupation, the stature and weight of the Scotch lead-miners of Wenlockhead, and the Welsh lead-miners of Cardiganshire, are given in the table. The occupation of lead-mining in both districts is in a great measure hereditary, and has probably been followed under similar conditions in Scotland and Wales for many generations, yet the Scotch exceed the Welsh lead-miners in stature by 2·13 inches, and in weight by 8·7 lbs. The stature and weight of the Durham coal-miners, and of the town populations of Glasgow, Sheffield, and Bristol, are given in this table, as they have been referred to above as influencing the averages of their respective counties, and placing them in an exceptional position as to the racial origin of their inhabitants.

39. One of the objects the Committee has had in view has been 'to ascertain the physical differences of boys and men whose intellect and industry are above or below the average'; but no returns of this kind have been received, except some referring to criminals and lunatics, and those have been introduced here as the most convenient place for their consideration:—

TABLE VIII.—Showing the STATURE and WEIGHT of Adult Male Criminals and Lunatics, compared with that of the General Population.

Classes	Height				Weight			
	Ages				Ages			
	20 to 25	25 to 35	35 to 45	45 to 55	20 to 25	25 to 35	35 to 45	45 to 55
	inches	inches	inches	inches	lbs.	lbs.	lbs.	lbs.
General—								
Average population	67·5	67·9	67·9	67·9	146·2	156·	162·	163·8
Class 3: country labourers	67·2	67·5	67·5	67·8	149·5	157·4	161·2	166·4
Class 4: town artisans	66·5	66·6	66·9	66·6	139·	147·3	154·1	148·6
Criminals	65·2	65·6	65·7	65·8	136·9	140·	141·4	143·4
Lunatics	65·7				147·9			

40. When compared with the general population, lunatics show a deficiency of stature of 1·96 inches, and of weight 10·3 lbs.; and criminals of 2·06 inches and 17·8 lbs., indicating a deficiency of physical as well as mental stamina in both these unfortunate classes of society. In respect to complexion lunatics show an excess of 5 per cent. of light eyes with dark hair, and criminals of 10 per cent. of dark eyes with dark hair over the general population.

TABLE IX.—Showing the COMPLEXION of Adult Male Criminals and Lunatics, compared with that of the General Population.

	No. of observations	Eyes light			Eyes dark			Eyes light brown, green, or exceptional, with hair light or dark	Total
		Hair light	Hair dark	Hair red	Hair dark	Hair fair	Hair red		
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	
England—									
General.	5,669	39·6	20·4	4·0	29·9	1·7	·7	3·7	100
Criminal	2,315	40·1	13·6	1·1	38·1	·6	·6	5·9	—
Lunatic.	1,409	42·3	20·3	1·5	31·8	1·8	·4	1·9	—
Total .	9,393	40·1	18·9	2·7	32·2	1·5	·6	4·	—
Wales—									
General.	704	34·4	19·9	9·8	26·4	4·7	1·3	3·5	100
Criminal	46	37·	17·4	—	45·6	—	—	—	—
Lunatic.	150	34·7	27·3	3·3	28·7	2·	—	4·	—
Total .	900	34·6	21·	8·2	27·8	4·	1·	3·4	—
Scotland—									
General.	1,261	46·3	24·5	5·2	21·2	·9	1·	·9	100
Criminal	194	44·3	20·1	2·6	30·	·5	1·5	1·	—
Lunatic.	342	47·4	30·7	1·4	17·3	1·4	1·2	·6	—
Total .	1,797	46·3	25·2	4·2	21·4	1·	1·1	·8	—
Ireland—									
General	285	49·8	18·2	3·5	23·5	1·1	1·8	2·1	100
Criminal	215	44·2	18·6	·5	28·7	·5	·5	7·	—
Lunatic	29	51·7	24·1	7·	17·2	—	—	—	—
Total .	529	47·4	19·	2·5	25·3	·7	1·1	4·	—
Total United Kingdom	12,619	41·	19·8	3·4	30·1	1·5	·7	3·5	—

41. As an example of the relation of high mental to physical qualities the stature of ninety-eight Fellows of the Royal Society is given. Their average stature is slightly above (0·38 inch) that of the professional classes of this country, to which the majority of them belong.

42. As an example of high physical qualities as developed by training, the measurements of eighty-nine professional and amateur athletes are given. Their average stature exceeds that of the general population from which they are drawn by 0·68 inch, while their average weight falls short of that standard by 14·5 lbs. The ratio of weight to stature is, in the athletes, 2·100 lbs., and in the general population 2·323 lbs., for each inch of stature. Thus, a trained athlete whose stature is 5 feet 7 inches should weigh 10 stones, while an untrained man of the same height should weigh 11 stones.

43. The statures of the Metropolitan Police and the London Fire Brigade are given as selected men of the working classes. The former exceed the criminal class, with whom they have to deal, in stature by 4·5 inches, and in weight by 45·3 lbs. The men of the Fire Brigade are selected for their activity, and general fitness to meet sudden and trying demands on their physical and mental energies. The data referring to them may be accepted, therefore, as typical of the best physique which can be obtained for an English army, and of which our army should consist at its best.

Complexion as determined by the Colour of the Eyes and Hair.

44. The difficulty of determining the prevailing complexion of a race, or of the mixed population of a country or a district, by the colour of the hair, as is generally done, and of basing a classification on it, is greater than at first sight appears. Not only do the various shades run imperceptibly into each other, but observers differ in their appreciation of the different shades when viewed under similar conditions, and the prevailing colour of a district determines the relative value of others. Thus a person living among a dark-haired race would consider brown hair as fair, while another person living among a light-haired people would consider it dark, or at any rate not fair in the same sense as the former would. Objections of this kind do not apply to the eyes, as the colour of the iris is due to the anatomical disposition of pigment in front of or behind that structure. In brown and the so-called black eyes a layer of brown pigment covers the *front* of the iris and hides the deeper structures, and itself determines the colour; while in blue and grey eyes this layer of pigment is wanting, and the colour is due to the dark pigment (the choroid) situated *behind* the iris, the blue colour in various degrees resulting from the greater translucency of a thin, and the grey from a thick membrane. The marriage, moreover, of fair and dark persons often produces an intermediate shade in the colour of the hair in the children, but only occasionally produces an intermediate change in the colour of the eyes, the rule being that they are blue or brown like one of the parents. The cross between the blue and brown eye should properly be called green (the deeper blue showing through an imperfect layer of yellow brown pigment), but from popular prejudice to this term, eyes of this mixed colour are generally recorded as brown grey, light brown or light hazel.[1]

45. For these reasons the classification adopted in this Report is based on the colour of the eyes, and with the object of more clearly defining the two prevailing shades of complexion in this country, namely the 'fair' as characterised by light eyes and light hair, and the 'dark' by dark eyes

[1] See the Report for 1880, p. 184, for a further discussion of this subject.

and dark hair, the mixed or neutral eyes are eliminated, and the dark hair is separated from the former, and the light hair from the latter class. The combinations of blue eyes and light red hair, and of brown eyes and dark red hair, are given in separate columns, but the result is not satisfactory, as many cases of light red have doubtless been returned as fair hair, and of dark red as dark brown hair.

46. In the instructions issued by the Committee observers were requested to return the colours of eyes as grey, light blue, blue, dark blue, light brown, brown, dark brown, green, and black; and the colour of the hair as very fair, fair, golden, red, red brown, light brown, brown, dark brown, black brown, and black, and some chromo-lithographic sheets as tests [1] for the colour of the hair were at first issued; but the system was found to be too complicated for ordinary observers to follow, and they were left to record the colours of both hair and eyes according to the popular meaning of the above terms. An examination of the returns shows that in many cases wide limits have been given to such words as fair, golden, and brown at one end of the scale, and of dark brown and black at the other, which has necessitated the concentration of the data to eliminate errors of observation, and what may be called the 'personal equation' of the colour-sense in different observers. In the Report of the Committee for 1880 a table is given of the colour of eyes and hair according to the above scale, of boys and men of the professional classes from ten to fifty years of age, but, apart from its including too wide a range of ages, it is not so well adapted for showing the relative prevalence of complexions as the one now given.

47. The following grouping of the counties according to the prevalence of fair complexion, or, what is the same thing, according to the degree of nigrescence, shows that certain large districts—much larger than the county boundaries—are occupied by inhabitants of similar racial origin, or who have been subject to conditions of life which have reduced them to similar shades of complexion. The division of the percentages into five degrees is, of course, quite arbitrary, and sometimes two counties, only divided from each other by a decimal, and belonging therefore to the same group, may be represented by a different number. The exact percentages are given in Table III.

48. In this classification the men with dark eyes and light hair are combined with those having neutral eyes (green) and light or dark hair, because they are few in number, and because this peculiar complexion is probably due to crossing of the light and dark stocks, and the persistence of one feature of the parent in the eyes and of the other in the hair. The fact that men with dark eyes and light hair are more frequently found in the south-western counties of England, where the light and dark races meet and overlap each other, supports this view of their mixed origin. This complexion, moreover, is common in childhood, but disappears as age advances. According to Table XI. it diminishes in males from 13 per cent., during the first five years of life to 1 per cent., at forty-five years of age, and in females from 16·4 per cent. to 2 per cent. during the same period.

[1] These test-sheets proved not to be well suited for the purpose for which they were intended. The colours were not well graduated, and did not possess the sheen or gloss of the natural hair, on which so much of the variation of the colour depends. On the subject of colour-scales, see the *Bulletins* of the Society of Anthropology of Paris, 3rd S. vi. pp. 91, 92.

TABLE X.—Classification of the Counties of Great Britain and the Provinces of Ireland according to the prevalence of FAIR COMPLEXION or the degree of NIGRESCENCE of Adult Males.

		Fair eyes, with fair hair	Fair eyes, with dark hair	Dark eyes, with dark hair	Degree of nigrescence	Neutral eyes, with light and dark hair
		No. per cent. 1 = above 50 2 = 45–50 3 = 40–45 4 = 35–40 5 = 30–35	No. per cent. 1 = 10 to 15 2 = 15 – 20 3 = 20 – 25 4 = 25 – 30 5 = 30 upwards	No. per cent. 1 under 20 2 = 20–25 3 = 25–30 4 = 30–35 5 = above 35		No. per cent. 1 = 0 to 2 2 = 2 – 4 3 = 4 – 6 4 = 6 – 8 5 = 8 upwards
Norse	Shetland	1	1	2	4	1
English and Scotch East Border Group.	Forfar and Kincardine	1	4	1	6	1
	Lanark and Renfrew	1	2	3	6	1
	Edinburgh, Linlithgow, Haddington, and Berwick	1	4	1	6	2
	Dumfries, Roxburgh, Selkirk, and Peebles	2	5	1	8	1
	Northumberland	1	3	2	6	3
	Durham	1	2	3	6	2
Central Irish Group.	Connaught	1	3	1	5	1
	Leinster	1	1	4	6	3
North Irish Group	Ulster	2	3	2	7	2
Scotch Highland Group.	Sutherland, Ross, Cromarty, and Skye	2	4	2	8	1
	Inverness	2	4	2	8	1
	Perth, Stirling, and Dumbarton	2	3	3	8	1
	Argyle, Bute, and Arran	2	3	3	8	2
	Islay and Colonsay	2	5	1	8	1
	Kirkcudbright, Ayrshire, and Wigton	2	5	3	10	1
North-East Scotch Group.	Caithness	2	4	2	8	4
	Aberdeen, Banff, Elgin, and Nairn	3	3	4	10	2
	Fife, Kinross, and Clackmannan	2	4	2	8	3
North English Group.	North and East Ridings of Yorkshire	2	3	2	7	5
	West Riding of Yorkshire	2	2	3	7	2
	Nottinghamshire	2	2	4	8	1
	Cumberland and Westmoreland	3	4	3	10	2
	Lancashire			4	8	2

English Fen Country Group.	Norfolk	3	3	3	9	4
	Cambridge and Huntingdonshire	3	1	5	9	1
	Northamptonshire	3	3	3	9	4
	Bedfordshire	4	1	5	10	3
South-west English Group.	Kent	3	1	5	9	3
	Sussex	3	2	5	10	3
	Surrey	2	2	4	8	2
	Oxfordshire and Buckingham	3	3	4	10	2
	Hampshire	3	2	5	10	3
	Wiltshire	3	4	3	10	1
	Gloucestershire (apparently exceptional)	1	1	4	6	2
	Dorsetshire	3	3	4	10	4
	Somersetshire	3	2	4	9	4
	Devonshire	3	3	3	9	3
	Cornwall	3	2	4	9	4
Welsh Group.	Denbigh and Flintshire	3	2	3	8	5
	Carnarvon, Anglesea, Merioneth, and Montgomery	3	1	5	9	3
	Cardiganshire	3	3	3	9	2
	Brecon and Radnor	3	3	4	10	1
	Glamorgan, Caermarthen, and Pembroke	3	3	2	8	5
	Shropshire	3	2	5	10	2
	Hereford and Monmouth	3	3	4	10	3
South-west Irish Group.	Munster	3	3	2	8	5
Mid-English Group.	Lincolnshire	4	3	5	12	2
	Leicester and Rutlandshire	5	2	5	12	3
	Warwickshire	4	2	5	11	3
	Worcestershire	4	2	5	11	1
London and Home Counties Group.	London	4	2	4	10	5
	Berkshire	4	2	5	11	4
	Hertfordshire and Middlesex	5	5	2	12	5
	Suffolk	5	3	4	12	5
	Essex	5	4	5	14	4

TABLE XI.—Showing the COLOUR of EYES and HAIR of

Males.

Age last birthday	Number of observations	Eyes light — Light blue, blue, dark blue, light grey, grey, dark grey — Hair: Very fair, fair, light brown, brown		Eyes light — Hair: Dark brown, black brown, black		Eyes light — Hair: Golden, red	Eyes neutral — Green, brown-grey, light brown — Hair: Very fair, fair, red, brown, black		Eyes dark — Brown, hazel, dark brown, black — Hair: Brown, dark brown, black brown, black		Eyes dark — Hair: Very fair, fair, light brown		Eyes dark — Hair: Red, auburn, red brown		Eyes: Light—Blue to grey	Eyes: Mixed—Green to light brown	Eyes: Dark—Brown to black	H: Light—Fair to brown	H: Red—Light to dark
		per cent.		per cent.		per cent.	per cent.		per cent.		per cent.		per cent.		per cent.			per c	
Birth	40	100		—		—	—		—		—		—		100	—	—	—	—
½	29	62		—		—	24		—		14		—		62	24	14	76	—
1	5	60		20		—	20		—		—		—		80	20	—	60	—
2	3	—	56·0	—	9·3	—	—	15·0	—	15·5	—	13·0	—	1·5	100	—	—	100	—
3	64	50		6		8	12		6		6		2		64	12	24	56	1
4	101	52		2		7	4		15		19		1		61	4	35	71	
5	197	52		5		7	7		16		12		1		64	7	29	64	
6	222	51		5		4	13		19		7		1		60	13	27	58	
7	265	51	51·4	5	5·6	5	14	10·8	17	19·2	7	7·4	1	1·0	61	14	25	58	
8	270	47		6		5	13		22		6		1		58	13	29	53	
9	340	56		7		2	7		22		5		1		65	7	28	61	
10	251	52		12		2	4		24		3		3		66	4	30	55	
11	265	54		11		5	4		20		5		1		70	4	26	59	
12	352	50	51·2	14	12·8	2	11	6·2	20	21·4	2	3·6	1	1·6	66	11	23	52	
13	464	48		12		4	6		23		5		2		64	6	30	53	
14	378	52		15		3	6		20		3		1		70	6	24	55	
15	253	53		14		3	10		17		2		1		70	10	20	55	
16	278	43		17		5	11		20		3		1		65	11	24	46	
17	345	40	43·8	14	14·2	4	12	11·2	25	25·6	4	3·2	1	0·8	58	12	30	44	
18	448	44		13		3	11		26		3		—		60	11	29	47	
19	454	39		13		6	12		25		4		1		58	12	30	43	
20	331	42		14		6	8		26		3		1		62	8	30	45	
21	281	48		18		3	6		22		2		1		69	6	25	50	
22	257	39	42·2	15	16·4	3	9	8·6	32	27·0	1	1·8	1	0·8	57	9	34	40	
23	261	43		17		2	9		26		2		1		62	9	29	45	
24	236	39		18		2	11		29		1		—		59	11	30	40	
25	199	41		17		5	7		27		3		—		63	7	30	44	
26	183	36		20		4	6		33		1		—		60	6	34	37	
27	189	34	32·8	20	20·8	2	8	7·0	30	32·0	3	2·0	3	1·2	56	8	36	37	
28	179	28		27		3	5		34		2		1		58	5	37	30	
29	150	25		20		7	9		36		1		2		52	9	39	26	
30–40	900	34		26		5	6		26		2		1		65	6	29	36	
40–50	392	33		34		6	6		20		1		—		73	6	21	34	
50–60	85	36		22		13	7		20		1		1		71	7	22	37	1
60–70	32	53		19		6	3		19		—		—		78	3	19	53	
70–																			

›xes at all Ages of English and Welsh Origin.

Females.

Age last birth-day	Number of observations	Eyes light — Light blue, blue, dark blue, light grey, grey, dark grey — Hair: Very fair, fair, light brown, brown	Eyes light — Hair: Dark brown, black brown, black	Eyes light — Hair: Golden, red	Eyes neutral — Green, brown-grey, light brown — Hair: Very fair, fair, red, brown, black	Eyes dark — Brown, hazel, dark brown, black — Hair: Brown, dark brown, black brown, black	Eyes dark — Hair: Very fair, fair, light brown	Eyes dark — Hair: Red, auburn, red brown	Eyes: Light—Blue to grey	Eyes: Mixed—Green to light-brown	Eyes: Dark—Brown to black	Hair: Light—Fair to brown	Hair: Red—Light to dark	Hair: Dark—Brown to black
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.			per cent.		
Birth	36	100	—	—	—	—	—	—	100	—	—	—	—	—
½	34	59	6	—	20	3	12	—	65	20	15	71	—	9
1	11	46	—	—	—	36	18	—	46	—	54	64	—	36
2	15	47 (47·8)	— (7·3)	— (—)	— (—)	33 (21·4)	13 (16·4)	7 (4·0)	47	—	53	60	7	33
3	45	47	7	—	4	18	22	2	54	4	42	69	2	25
4	119	40	9	9	5	17	17	3	58	5	37	57	12	26
5	192	53	7	3	9	19	8	1	63	9	28	61	4	26
6	229	51	10	5	9	17	5	3	66	9	25	56	8	27
7	223	53 (52·6)	9 (8·8)	3 (3·4)	9 (7·6)	16 (20·2)	8 (5·6)	2 (1·3)	65	9	26	61	5	25
8	178	53	12	3	7	21	3	1	68	7	25	56	4	33
9	237	53	6	3	4	28	4	2	62	4	34	57	5	34
10	281	60	8	4	2	22	3	1	72	2	26	63	5	30
11	322	52	11	4	4	22	5	2	67	4	29	57	6	33
12	298	47 (51·0)	15 (10·8)	3 (3·8)	6 (5·6)	25 (23·8)	1 (3·2)	3 (1·8)	65	6	29	48	6	40
13	251	47	10	5	6	27	4	1	62	6	32	51	6	37
14	265	49	10	3	10	23	3	2	62	10	28	52	5	33
15	167	45	12	1	9	27	4	2	58	9	33	49	3	39
16	110	52	17	1	5	20	4	1	70	5	25	56	2	37
17	47	55 (47·0)	17 (15·0)	— (—)	7 (7·8)	17 (23·8)	4 (4·4)	— (1·3)	72	7	21	59	—	34
18	64	37	15	—	9	31	8	—	52	9	39	45	—	46
19	94	46	14	4	9	24	2	1	64	9	27	48	5	38
20	125	46	10	3	10	25	5	1	59	10	31	51	4	35
21	60	38	17	3	10	30	—	2	58	10	32	38	5	47
22	53	51 (45·0)	15 (13·0)	2 (3·2)	9 (11·8)	19 (24·0)	4 (4·0)	— (1·5)	68	9	23	55	2	34
23	31	45	13	3	10	26	3	—	61	10	29	48	3	39
24	20	45	10	5	20	20	—	—	60	20	20	45	5	30
25														
26														
27	46	38	15	2	8	31	2	4	55	8	37	40	6	46
28														
29														
30–40	27	44	12	3	11	30	—	—	59	11	30	44	3	42
40–50														
50–60														
60–70	20	30	20	15	10	25	—	—	65	10	25	30	15	45
70–														

49. In connection with this subject Table XI., showing the colour of eyes and hair in both sexes and at all ages, should be studied, as it shows the comparative worthlessness of the method often resorted to on the Continent of determining the racial elements of a country by examining the complexion of school children of different ages. The first column, referring to males (light eyes and fair hair), shows the gradual darkening of the hair of fair-complexioned children from 56 per cent. at the first five years of life to 33 per cent. at forty-five years; and the second column (light eyes with dark hair) increases during the same period at nearly a corresponding rate, the percentage of dark hair being 9·3 in the first five years and 34 at forty-five years of age. Thus, $56 + 9{\cdot}3 = 65{\cdot}3$, and $33 + 34 = 67$, or only 1·7 per cent. excess of dark hair received from other sources, or due to probable error of observation. In like manner the green and light-brown eyes of the middle column of the table decrease in number, or in other words become darker, and are transferred to the next column (dark eyes and dark hair) as age advances, from 15 per cent. at the first five years to 6 per cent. at forty-five years of age. The fifth column (dark eyes and hair) increases at the expense of the two adjoining columns from 15·5 per cent. at three and four years to 36 per cent. at twenty-nine years, after which age the percentage falls off very rapidly on account of the earlier accession of grey hair in the dark than the fair complexion of the first column, to which the higher percentages become transferred. The low percentage of dark complexion at ages from forty to seventy years does not arise from the elimination of this complexion by advancing age, or by death, but from the fault of the observers not having recorded the original colour of the hair before it became grey, which necessitated the rejection of all such returns in drawing up the table.

50. The table referring to females shows that darkening of the hair and eyes takes place to a much less extent amongst them than among males, and that there is little disposition for the dark hair to turn grey with advancing age. For corresponding periods to those applied to males, the fair-complexioned females in the first column lose 3·8 per cent. of their number, while the second column receives an accession of dark hair of 4·7 per cent. The dark-complexioned (dark eyes and hair) females in the fifth column increase by 8·6 per cent., at the sole expense of the sixth column, by the darkening of the hair. Unlike the males, the column showing the neutral eyes somewhat increases instead of decreases; and this increase appears to have come from the column containing the fair eyes and red hair, or it may be attributed to the difference in the 'colour equation' of some of the observers—women being much more critical, and therefore less consistent, than men in the definition of colours.

NOTE.—Dr. Beddoe proposes the use of indices of nigrescence for the classification of the colour of hair and eyes. 'That for the hair is got by subtracting the fair and the red from the dark hair plus twice the black, leaving out the neutral browns, thus:—

2 Black (N) + Dk. Br. − Fair − Red = Index.

The black hair is doubled, because its occurrence shows a much greater tendency to melanosity. The index for the eyes is got by subtracting the light from the dark *and neglecting* the neutral shades, thus:—

Dark − Light = Index.'

Children and Adults of both Sexes.

51. A large portion of the statistics collected by the Committee refer to children, and these, together with those referring to the adults already considered in the early part of this Report, have been arranged in Tables XV. to XXV. to show the influence of age, sex, nurture, occupation, and sanitary surroundings on the physical development of the British population. The children are chiefly those of English parents, as few returns have been received from other parts of the kingdom. All classes of the community are represented, from the upper and professional classes whose children attend the Public Schools, like Eton, Marlborough, and Radley, to the poorest town population, whose children are found in the public elementary (or Board) schools, charitable institutions, and industrial schools. The adults also include all classes, from the Universities of Oxford and Cambridge, to town labourers and factory operatives.

52. In deciding upon the arrangement for practical purposes of returns so varied in their origin, and yet consisting in so large a proportion of information derived from special sources, the first consideration has been to establish a classification of the returns according to the *media*, or influences which have been instrumental in differentiating one class from another. The Committee has adopted the subjoined scheme, prepared by Mr. Roberts, and first brought before the Association in a paper read in the Anthropological Section in 1878. It is based on the principle of collecting into a standard class as large a number of cases as possible which imply the most favourable conditions of existence in respect to fresh air, exercise, and wholesome and sufficient food—in one word, nurture—and specialising into classes which may be compared with this standard those which depart more or less from the most favourable condition. By this means, in respect to social condition, the influence of mental and manual work; in respect to nurture, the influence of food, clothing, &c., on development; in respect to occupation, the influence of physical conditions; and in respect to climate and sanitary conditions, the influence of town and country life may be determined.

53. The classification has been constructed on the physiological and hygienic laws which are familiar to the students of sanitary science, and on a careful comparison of the measurements of different classes of the people, and especially of school children of the age of from eleven to twelve years. This age has been selected as particularly suited to the study of the *media*, or conditions of life, which influence the development of the human body, as it is subject to all the wide and more powerful agencies which surround and divide class from class, but is yet free from the disturbing elements of puberty and the numerous minor modifying influences, such as occupation, personal habits, &c., which in a measure shape the physique of older boys and adults. The data on which the classification has been based are given below. The most obvious facts which the figures disclose are the check which growth receives as we descend lower and lower in the social scale, and that a difference of five inches exists between the average statures of the best and the worst nurtured classes of children of corresponding ages, and of $3\frac{1}{2}$ inches in adults.

TABLE XII.—Classification of the British Population according to *Media*—Occupation and other conditions of life.

*Social Condition.**—Non-labouring Classes.			Labouring Classes			
Nurture.†—Very Good		Good	Imperfect		Bad	
Professional Classes ‡ (Upper and Upper Middle Classes) 4·46 per cent.		Commercial Class (Lower Mid. Classes) 10·36 per cent.	Labourers 47·46 per cent.	Artisans 26·82 per cent.	Industrial Classes (Sedentary Trades) 10·90 per cent.	Selected Classes
Out-door § Country	In-door Towns	In-door Towns	Out-door Country	In-door Towns	In-door Towns	
CLASS I.		CLASS II.	CLASS III.	CLASS IV.	CLASS V.	CLASS VI.
Country-gentlemen.		Teachers in Elementary Schools.	Labourers and Workers on Agriculture.	Workers in „ Wood.	Factory Operatives.	Policemen.
Gentlemen-farmers.		Clerks.	„ Gardens.	„ Metal.	Tailors.	Fire Brigade.
Officers of Army and Navy.		Shopkeepers.	„ Roads.	„ Stone.	Shoemakers.	Soldiers.
Auxiliary Forces.		Shopmen.	„ Railways.	„ Leather.	&c.	Recruits.
Clergymen.		Dealers in „ Drugs.	„ Quarries.	„ Paper. &c.		Lunatics.
Lawyers.		„ Books.	Navvies.	Engravers.		Criminals.
Doctors.		„ Wool.	Porters.	Photographers.		Industrial-schools.
Civil Engineers.		„ Silk.	Guards.	Printers.		
Architects.		„ Cotton.	Woodmen.	&c.		
Dentists		„ Foods.	Brickmakers.			
	Civil Servants.	„ Drinks.				
	Authors.	„ Furniture.	Labourers, &c., on Water.			
	Artists.	„ Metals.	„ Sailors.			
	Teachers.	„ Glass.	„ Fishermen.			
	Musicians.	„ Earthenware.	„ Watermen.			
	Actors.	„ Fuel, &c.	Labourers, &c., in Mines.			
	Bankers.		„ Coal.			
	Merchants (Wholesale).		„ Minerals.			

* Social Condition ; (influences of leisure, mental and manual labour).
† Nurture ; (influences of food, clothing, nursing, domestic surroundings, &c.)
‡ Occupation ; (influences of external physical conditions, exercise, &c.) Percentage of male population, including male children (Census of 1871).
§ Climatic and sanitary surroundings.

TABLE XIII.—Table showing the RELATIVE STATURES of BOYS of the age of 11 to 12 years, under different social and physical conditions of life. The zigzag line running through the *means* shows the degradation of stature as the boys are further and further removed from the most favourable conditions of growth.

Height in inches	Total No. of Observations	Public Schools	Middle-class Schools		Elementary Schools				Military Asylums	Industrial Schools
		Country	Upper — Towns	Lower — Towns	Agricultural Labourers — Country	Artisans — Towns	Factories and Workshops			
							Country	Towns		
60–	6	2	—	3	—	1	—	—	—	—
59–	16	2	3	5	2	2	—	—	1	—
58–	35	9	9	8	5	0	2	—	2	—
57–	66	11	17	13	4	4	5	5	7	1
56–	118	21	23	27	14	4	10	3	15	—
55–	230	28	35	57	32	15	13	17	33	—
54–	329	33	53	68	47	24	36	20	46	2
53–	361	15	55	58	47	26	34	38	84	4
Mean 52–	441	14	37	61	58	36	52	59	118	6
51–	370	6	25	40	36	28	45	57	123	10
50–	367	7	23	27	32	17	46	61	143	11 Mean
49–	252	2	8	20	14	12	31	40	114	11
48–	132	—	3	1	7	4	11	20	76	10
47–	102	—	3	4	5	7	5	13	59	6
46–	22	—	—	—	1	1	3	7	7	3
45–	12	—	—	—	—	—	—	1	10	1
44–	1	—	—	—	—	—	—	—	0	1
43–	1	—	—	—	—	—	—	—	1	—
42–	1	—	—	—	—	—	—	—	1	—
Total . .	2862	150	294	392	304	181	293	341	840	66
Average hgt.	52·60	54·98	53·85	53·70	53·01	52·60	52·17	51·56	51·20	50·02
Mean height	52·5	55·0	54·0	53·5	53·0	52·5	52·0	51·5	51·0	50·0

TABLE XIV.—Showing the RELATIVE STATURE of ADULTS of the ages from 25 to 30 years under different social and physical conditions of life.

The horizontal black lines show the *mean* Height of each class and the degradation from the standard class.

Height in inches	General Population, all Classes	Class I. Professional Classes	Class II. Commercial Classes, Clerks and Shopkeepers	Class III. Labouring Classes, Agriculturl. Miners, Sailors	Class IV. Artisan Classes living in Towns	Class V. Sedentary Occupations: Factories, Tailors	Class VI.—Special Classes	
							Prisoners, all Classes	Lunatics, all Classes
76-	—	—	—	—	—	—	—	—
75-	1	—	—	1	—	—	—	—
74-	7	1	—	6	—	—	1	—
73-	19	3	2	11	2	1	2	1
72-	39	7	6	24	2	—	3	2
71-	66	9	8	42	3	4	6	6
70-	114	21	14	56	14	9	20	7
69-	176	20	30	103	15	8	29	18
68-	222	13	25	130	41	13	41	20
67-	309	16	35	179	57	22	73	40
66-	282	8	24	144	78	28	78	62
65-	241	4	19	111	64	43	70	51
64-	151	2	11	69	38	31	78	52
63-	74	2	5	38	17	12	41	29
62-	39	—	1	20	4	14	21	29
61-	15	1	—	6	5	3	17	12
60-	4	—	—	1	2	1	2	5
59-	6	—	—	2	—	4	1	4
58-	1	—	—	1	—	—	1	1
57-	1	—	—	1	—	—	—	2
56-	—	—	—	—	—	—	1	—
Total	1935	107	180	945	342	193	491	341
Mean Height . .	67·5	69·0	68·0	67·5	66·5	65·5	66·0	65·5
Average . . .	67·43	69·14	67·95	67·51	66·61	65·92	66·16	65·65
Average . . .	67·21	Calculated from the percentage portion of the five classes in the general population.						

Infants at Birth. Table XV.

54. The statistics relating to infants at birth have been tabulated separately, because the conditions of measurement differ from those of other children, the stature having been taken in the recumbent position, and the weight without clothing. The parents of the infants were English and Scotch; and although the charitable institutions from which the observations were obtained are situated in London and Edinburgh, persons bred in the country are frequently admitted as inmates, and it is probable, therefore, that the statistics fairly represent the labouring classes. Observations on infants of other classes of society could not be obtained. The statistics refer only to infants presumably born at the full period of gestation, and contain the due proportion of twin births. The table is constructed to show the relative stature and weight of each infant, and the differences between the sexes.

55. The table is one of great interest to the student examining the physical development and the physical improvement of a race, as it presents the materials with which he has to deal in its earliest and simplest form. According to this table the average length of male infants is 19·52 inches, and of females 19 32 inches, showing a difference of only one-fifth of an inch. The average naked weight of male infants is 7·12 lbs., and of females 6·94 lbs., a difference of about 3 ounces in favour of males. The range of height between the tallest and shortest male infants is 10 inches, while that of boys of 15 years, when the disturbing influences of puberty are present, is 27 inches. This wide range in adolescence becomes contracted in adults to 20 inches. The range of height of female infants is two inches less than that of male infants, which may be due to accidental causes, but which suggests a less disposition to variation in the size in females than in males,[1] and which may be the cause of the greater freedom of female infants from accidents at the time of birth. It has been ascertained that still births occur in this country in the proportion of 140 males to 100 females, and this higher death-rate of male infants has been attributed to their greater size. We have no statistics of the size or weight of still-born infants, although they could be more easily obtained than those of living infants, but the table before us would seem to confirm this view, as the largest surviving infants are those of males. It would appear, therefore, that the physical (and most probably the mental) proportions of a race, and their uniformity within certain limits, are largely dependent on the size of the female pelvis, which acts as a gauge, as it were, of the race, and eliminates the largest infants, especially those with large heads (and presumably more brains), by preventing their survival at birth.[2]

[1] The greater disposition to vary in range of stature of males than females has been already referred to in the Report of the Committee for 1880, p. 141, in connection with Sir Rawson Rawson's analysis of the successive annual measurements of 12 boys and 13 girls made by Professor Bowditch, of Harvard, United States. 'A marked feature in the charts when compared together is the greater regularity and parallelism of the growth of the girls, especially at the earlier periods of life.'

[2] To ascertain if there is any difference between the circumference of the skull as compared with that of the pelvis in adults of very different races of man, Mr. Roberts has measured the skulls and pelves of some European and Andamanese

TABLE XV.—Showing the HEIGHT (LENGTH) and WEIGHT of Infants of both Sexes at Birth.

Height, nearest inch	Weight in lbs. (naked)																		Total at each height		Average weight		Ratio, Weight ÷ Height	
	3½		4½		5½		6½		7½		8½		9½		10½		11½							
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
24	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	9·5	—	·354	—
23	—	—	—	—	—	—	—	—	1	1	2	3	2	—	1	—	—	—	6	4	9·0	8·2	·391	·356
22	—	—	—	—	—	—	1	3	4	3	8	11	6	2	—	—	1	—	20	19	8·5	8·1	·386	·368
21	—	—	—	—	—	—	11	10	40	38	21	6	1	5	2	1	—	—	75	60	7·7	7·7	·366	·366
20	—	—	—	—	5	8	32	38	69	50	25	16	2	5	—	—	—	—	133	117	7·4	7·3	·370	·366
19	—	—	1	—	17	17	45	64	44	36	7	12	2	2	—	—	—	—	116	131	6·9	6·9	·363	·363
18	—	—	1	7	18	30	41	47	10	23	3	2	—	—	—	—	—	—	73	109	6·4	6·3	·355	·350
17	—	—	3	6	13	10	3	6	—	3	—	—	—	—	—	—	—	—	19	25	5·5	5·7	·323	·335
16	—	—	4	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	6	1	5·0	5·5	·312	·344
15	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	3·5	—	·233	—
Total at each weight	2	—	9	13	55	66	133	168	168	154	66	50	14	14	3	1	1	—	451	466	7·1	6·9	—	—
Average height	15·0	—	17·0	17·5	18·2	18·3	19·0	19·0	19·8	19·7	20·5	20·4	21·5	20·5	21·7	21·0	22·0	—	19·52	19·32	—	—	—	—
Ratio, Height ÷ Weight	4·28	—	3·77	3·88	3·31	3·32	2·92	2·92	2·64	2·62	2·44	2·45	2·26	2·16	2·06	—	—	—	—	—	—	—	—	—

NOTE.—According to this table, the average difference in the length and weight of the two sexes at birth is ½th of an inch and ½th of a pound in favour of males; but as the table contains 1 female and 8 males below 17 inches and 5 lbs., it is probable that the average for females is a little too high. On the other hand, one male is returned as 24 inches long and another as weighing 11 lbs., but there are no females of corresponding size. The statistics were obtained from the Queen Charlotte's Lying-in Hospital, London, and from the Royal Maternity Charity, Edinburgh.

Growth of Children of both Sexes.

56. Tables XVI. to XXII. show the growth of children of four of the five classes into which the returns have been divided. Class I. comprises the upper and professional classes and their children, and it may be accepted as representing the best physique of this country, and used as a standard with which to compare all other classes. According to the census of 1871 this class constitutes 4·46 per cent. of the population. Class II. consists of the commercial classes, such as clerks and shopkeepers and their children, whose occupations are carried on in towns, and for the most part indoors, and therefore under less favourable conditions to healthy development than the constituents of Class I. Class II. comprises 10·36 per cent. of the population. Class III. represents the labouring classes, such as agricultural labourers, fishermen, miners, and others who follow outdoor healthy occupations, but whose nurture is inferior to the two former classes. This class comprises 47·46 per cent. or nearly half the population of the country. Class IV. represents the mass of our town population engaged as artisans. Their trades, being carried on indoors, and requiring less physical exercise than Class III., place them under less favourable conditions as to sanitary surroundings. This class forms 26·82 per cent., or about a fourth of the population. Class V., comprising persons living in towns and following sedentary occupations under the most unfavourable conditions as to nurture and sanitary surroundings, has been omitted from the tables, as sufficient data have not been received to fairly represent it. This class constitutes 10·90 per cent. of the population.

57. The average stature and weight of each of the four classes have been worked out from the number of observations for each class, but as the several classes constitute different proportions of the general population the average representing the 'general population' has not been worked out from the total number of observations, but is the average of skeletons in the Museum of the Royal College of Surgeons, with the following results:—

	Stature. Metres.	Average circumference of Pelvis. m.m.	Average circumference of Head. m.m.	Ratio of Pelvis to Head.
1 European female	1·592	430	500	1 to 1·16
6 European males	1·712	410	530	1–1·29
Female pelvis		430 Male head	530	1–1·23
10 Andamanese females	1·408	348	462	1–1·33
7 Andamanese males	1·492	337	477	1–1·42
Female pelvis		348 Male head	477	1–1·37

Only one European female skeleton was available for these measurements, but it appeared to be in every respect a normal one.

From these measurements it is obvious that the difference between the circumference of the head and the pelvis in the adult is much less in the large European than in the small Andaman race, and it is not improbable that the relatively small pelvis of the female Andamanese has been instrumental, in some measure, in differentiating that diminutive race. It is probably in this direction we must look for an explanation of the degenerating influences of town life and sedentary occupations, as they, together with the new movement for the higher education of women, favour the productions of large heads and imperfectly developed bodies of women in this and other civilised countries, and a corresponding disproportion between the size of the head and the circumference of the pelvis.

the other four averages, and it is therefore the average of the four classes rather than of all the individuals measured and weighed. The observations referring to adults are fairly representative of the general population as they were received from all parts of the country; but those referring to children were received from schools devoted to the education of special classes of society, and in numbers which did not correspond with their respective percentage proportion of the general population. By adopting the average of the averages of the four classes into which the school children have been distributed according to the occupations of their parents, the inequality of the percentage proportion has been eliminated. Tables and a diagram showing the *mean* stature, weight, chest-girth, and strength of males, as deduced from all the observations collected by the Committee, are given in the Report of 1881.

58. Tables (XIII., XIV.) have already been given (s. 53) which show the falling off in the average stature of children of the age 11–12 years, and of adults of the age 25–30 years, as the conditions under which they live are less and less favourable to healthy physical development. The children vary to the extent of five inches, and the adults to $3\frac{1}{2}$ inches, and corresponding variations occur in the weights and other physical qualities.

59. Plate X. shows the growth in stature, weight, and strength of individuals of both sexes, and the girth of chest, head, arm, and leg of males as far as they have been recorded in the returns received by the committee. The tracings are made from the *averages* in the column representing the general population. Similar tracings of the standard class (males) having been given in the Report for 1880.

60. An examination of the curves and tables shows the following facts:—

(1) Growth is most rapid during the first five years of life; the observations, however, at those ages are not sufficient in number or variety to give a trustworthy average.

(2) From birth to the age of five years the rate of growth is the same in both sexes, girls being a little shorter in stature and lighter in weight than boys.

(3) From 5 to 10 years boys grow a little more rapidly than girls, the difference being apparently due to a check in the growth of girls at these ages.

(4) From 10 to 15 years girls grow more rapidly than boys, and at the ages $11\frac{1}{2}$ to $14\frac{1}{2}$ are actually taller, and from $12\frac{1}{2}$ to $15\frac{1}{2}$ years actually heavier than boys. This difference appears to be due to a check in the growth of boys as well as an acceleration in the growth of girls incident on the accession of puberty.

(5) From 15 to 20 years boys again take the lead, and grow at first rapidly, and gradually slower, and complete their growth at about 23 years. After 15, girls grow very slowly, and attain their full stature about the 20th year.

(6) The tracings and tables show a slow but steady increase in stature up to the 50th year, and a more rapid increase in weight up to the 60th year in males, but the statistics of females are too few after the age of 23 to determine the stature and weight of that sex at the more advanced periods of life.

(7) The curve of the chest-girth in males shows an increase at a rate similar to that of the weight up to the age of 50 years, but it *appears to* have no definite relation to the curve of stature.

(8) The strength of males increases rapidly from 12 to 19 years, and

at a rate similar to that of the weight; more slowly and regularly up to 30 years, after which it declines at an increasing rate to the age of 60 years. The strength of females increases at a more uniform rate from 9 to 19 years, more slowly to 30, after which it falls off in a manner similar to that of males. The curves of strength for the two sexes are not parallel: at 11 years females are weaker than males by 22 lbs., at 20 years of age by 36 lbs.

The Period of Maturity in Man.

61. The Tables do not show distinctly at what period man attains his full stature, and much difference of opinion exists on this subject. Some French writers (Barnard, Allaire, &c.) maintain that growth in height goes on until the 32nd or 35th year, and Dr. Baxter arrives at the same conclusion from the statistics of the United States Army; while most English writers (Danson, Aitken, Roberts, &c.) regard the 25th as the year of mature growth, and Dr. Beddoe places it as early as the 23rd year, admitting, however, that a slight increase may take place after this age. The difference of opinion on this subject arises, no doubt, from the faulty method of relying on the measurements of many different individuals, instead of measuring the same individuals from year to year until growth ceases. The elimination of the weak and ill-developed by death, the difficulty of following the same class, and all the members of the class, through successive years, and the selection of special classes (*i.e.* recruits whose ages are never certain), invalidate all conclusions as to the period of maturity drawn from statistics of measurements of many different persons; but, allowing for these sources of error, and judging by the run of the curves formed by the means and averages, it is probable that little actual growth takes place after the age of 21, and that it entirely ceases by the 25th year. It is evident, moreover, from Table XVI., that the full stature is attained earlier in the well-fed and most favoured class (Class I.) than in the ill-fed and least favoured classes of the community (Class IV.).

62. It is difficult to understand, moreover, how any increase of stature can take place after the bones of the skeleton have become consolidated, and the epiphyses firmly united to the body of their respective bones; and the last of these unions in the long bones, on which the stature depends, occurs about the 23rd year. In adopting the 23rd year for men and the 20th for women as the ages of the attainment of maturity the committee was influenced by these considerations, and a desire to understate rather than overstate its case, and to embrace as large a number of observations as possible in its tables. In inquiries of this kind there is generally a slight amount of unconscious selection, very small persons being passed over, or having objections to being measured; and any deficiency of this kind will be balanced by the loss of growth which may occur after the age of 23 years. Females attain to maturity earlier than males, and the age of full growth has been fixed three years earlier for them.

Influence of Advancing Age.

63. The maintenance of the stature throughout life as shown by Table XVI. is a new and unexpected fact, but it is probably due to the survival of the taller and better developed members of the population, and the elimination by disease or death of the smaller and feebler ones. Quetelet

TABLE XVI.—Showing the Average STATURE (without shoes), at all Ages, of different Classes of the Population of Great Britain.

Males.

Age last Birthday	General Population. All Classes. Town and Country			Class I. Professional Classes. Town and Country			Class II. Commercial Classes. Towns			Class III. Labouring Classes. Country			Class IV. Artisans. Towns		
	No. Obs.	Average Height. Inches	Increase. Inches.	No. Obs.	Average Height. Inches	Increase. Inches.	No. Obs.	Average Height. Inches	Increase. Inches	No. Obs.	Average Height. Inches.	Increase Inches.	No. Obs.	Average Height. Inches.	Increase. Inches
Birth	451	19·52	—	—	—	—	—	—	—	—	—	—	451	19·52	—
0–1	2	27·00	—	—	—	—	—	—	—	2	—	—	—	—	—
1–	1	33·50	—	—	—	—	—	—	—	1	—	—	—	—	—
2–	5	33·70	—	—	—	—	—	—	—	5	—	—	—	—	—
3–	33	36·82	—	—	—	—	—	—	—	22	37·41	—	11	36·23	—
4–	107	38·46	1·64	—	—	—	—	—	—	19	39·30	1·89	88	37·63	1·40
5–	201	41·03	2·57	—	—	—	—	—	—	34	42·35	3·05	167	39·72	2·09
6–	266	44·00	2·97	—	—	—	1	45·50	—	34	44·59	2·24	231	41·90	2·18
7–	307	45·97	1·97	—	—	—	4	47·50	—	39	45·81	1·22	264	44·60	2·70
8–	1524	47·05	1·08	—	—	—	61	47·60	—	324	47·09	1·28	1139	46·46	1·86
9–	2278	49·70	2·65	22	50·80	—	211	50·03	2·43	485	49·11	2·02	1560	48·88	2·42
10–	1551	51·84	2·14	101	53·69	2·89	331	52·04	2·01	783	50·93	1·82	336	50·72	1·84
11–	1766	53·50	1·66	242	55·23	1·54	687	53·76	1·72	597	52·32	1·39	240	52·68	1·96
12–	1981	54·99	1·49	490	57·29	2·06	902	55·29	1·53	395	53·67	1·35	194	53·72	1·04
13–	2743	56·91	1·92	869	59·08	1·79	857	57·43	2·14	403	55·31	1·64	614	55·81	2·09
14–	3428	59·33	2·42	966	61·29	2·21	800	59·47	2·04	9	57·94	2·63	1653	58·61	2·80
15–	3498	62·24	2·91	974	63·61	2·32	544	62·19	2·72	515	61·82	3·88	1465	61·36	2·75
16–	2780	64·31	2·07	1102	66·23	2·62	110	64·55	2·36	177	63·62	1·80	1391	62·85	1·49
17–	2745	66·24	1·93	1852	67·81	1·58	107	66·59	2·04	75	65·87	2·25	711	64·70	1·85
18–	2305	66·96	·72	1724	68·26	·45	62	67·44	·85	148	66·53	·66	371	65·60	·90
19–	1434	67·29	·33	951	68·58	·32	63	67·55	·11	143	66·87	·34	277	66·17	·57
20–	880	67·52	·23	461	69·08	—	61	67·58	·03	183	66·93	·06	175	66·50	·33
21–	757	67·63	·11	364	68·70	·12	51	67·79	·21	177	67·15	·22	165	66·55	·05
22–	558	67·68	·05	227	68·94	—	53	67·82	·03	169	67·35	·20	109	66·60	·05
23–	592	67·48	—	114	68·73	·03	59	67·42	—	274	67·38	·03	145	66·40	—
24–	517	67·73	·05	57	68·82	·09	62	68·09	·27	258	67·47	·09	140	66·55	—
25–							47	67·93	—	218	67·52	·05	92	66·40	—
26–							47	68·07	—	194	67·46	—	74	66·46	—
27–	1576	67·80	·07	107	69·14	·32	27	68·13	·04	162	67·76	·24	66	66·67	·07
28–							33	67·65	—	208	67·31	—	59	66·65	—
29–							26	67·96	—	163	67·54	—	53	66·82	·15
30–35	1886	68·00	·20	52	69·61	·37	85	67·70	—	745	67·59	—	180	66·65	—
35–40							82	68·07	—	631	67·62	—	111	67·08	·26
40–50	1148	67·96	—	46	69·38	—	79	68·09	—	943	67·56	—	80	66·80	—
50–60	198	67·92	—	13	69·50	—	16	67·69	—	147	68·06	·30	22	66·45	—
60–70	44	67·41	—	5	69·10	—	3	66·16	—	34	67·88	—	2	66·50	—
70–	12	69·22	1·22	—	—	—	1	68·50	—	11	69·95	1·89	—	—	—
Total Obs.	37574	—	—	10739	—	—	5472	—	—	8727	—	—	12636	—	—

TABLE XVII.—Showing the Average STATURE (without shoes), at all Ages, of different Classes of the Population of Great Britain.

Females.

Age last Birth-day	General Population. All Classes. Town and Country			Class I. Professional Classes. Town and Country			Class II. Commercial Classes. Towns			Class III. Labouring Classes. Country			Class IV. Artisans. Towns		
	No. Obs.	Average Height. Inches	Increase. Inches	No. Obs.	Average Height. Inches	Increase. Inches	No. Obs.	Average Height. Inches.	Increase. Inches	No. Obs.	Average Height. Inches.	Increase. Inches	No. Obs.	Average Height. Inches	Increase. Inches
Birth	466	19·31	—	—	—	—	—	—	—	—	—	—	466	19·31	—
0–1	6	24·83	5·52	—	—	—	—	—	—	—	—	—	6	24·83	5·52
1–	9	27·50	2·67	—	—	—	1	28·50	—	—	—	—	7	27·38	2·55
2–	6	32·33	4·83	—	—	—	—	—	—	—	—	—	6	32·00	4·62
3–	43	36·23	3·90	—	—	—	11	37·68	—	8	36·78	—	24	35·33	3·33
4–	99	38·26	2·03	—	—	—	12	38·50	·82	19	38·97	2·19	68	37·30	1·97
5–	157	40·55	2·29	—	—	—	10	40·00	1·50	43	41·87	2·90	104	39·77	2·47
6–	189	42·88	2·33	—	—	—	14	42·50	2·50	44	43·43	1·56	131	41·84	2·07
7–	173	44·45	1·57	—	—	—	30	44·43	1·93	47	45·35	1·92	96	43·56	1·72
8–	432	46·60	2·15	—	—	—	18	47·16	2·73	119	47·10	1·75	295	45·55	1·99
9–	499	48·73	2·13	—	—	—	42	49·90	2·74	175	48·93	1·83	282	47·36	1·81
10–	480	51·05	2·32	11	53·41	—	52	51·44	1·54	149	50·40	1·47	268	48·96	1·60
11–	441	53·10	2·05	22	55·04	1·63	87	53·33	1·89	115	52·48	2·08	217	51·54	2·58
12–	225	55·66	2·56	23	57·41	2·37	87	55·68	2·35	22	55·59	3·11	93	53·98	2·44
13–	206	57·77	2·11	68	59·03	1·62	66	58·47	2·79	14	57·36	1·77	58	56·22	2·24
14–	240	59·80	2·03	79	60·78	1·75	86	60·62	2·15	12	59·16	1·80	63	58·56	2·34
15–	201	60·93	1·13	70	62·11	1·33	98	61·28	·66	—	—	—	33	59·41	0·85
16–	136	61·75	·82	49	62·54	·43	82	61·56	0·28	—	—	—	5	61·16	1·75
17–	88	62·52	·77	20	62·83	·29	68	62·22	·66	—	—	—	—	—	—
18–	62	62·44	—	25	62·84	·01	37	62·05	—	—	—	—	—	—	—
19–	98	62·75	·23	48	63·40	·56	50	62·10	—	—	—	—	—	—	—
20–	130	62·98	·23	59	63·39	—	71	62·58	·36	—	—	—	—	—	—
21–	60	63·03	·05	24	63·63	·23	36	62·44	—	—	—	—	—	—	—
22–	53	62·87	—	13	63·53	—	40	62·22	—	—	—	—	—	—	—
23–	24	63·01	—	13	63·42	—	11	62·66	·08	—	—	—	—	—	—
24–	21	62·70	—	5	63·60	—	—	—	—	—	—	—	16	61·81	·65
25–30	43	62·02	—	19	62·97	—	—	—	—	—	—	—	24	61·08	—
30–35				8	63·25	—	—	—	—	—	—	—	—	—	—
35–4				—	—	—	—	—	—	—	—	—	11	60·90	—
40–5	30	61·15	—	—	—	—	—	—	—	—	—	—	5	60·60	—
50–60				—	—	—	—	—	—	—	—	—	1	61·50	—
60–70				—	—	—	—	—	—	—	—	—	2	60·50	—
70–				—	—	—	—	—	—	—	—	—	3	60·16	—
Total Obs.	4616	—	—	556	—	—	1009	—	—	767	—	—	2284	—	—

TABLE XVIII.—Showing the Average WEIGHT (including clothes), at all Ages, of different Classes of the Population of Great Britain.

Males.

Age last Birthday	General Population. All Classes. Town and Country			Class I. Professional Classes. Town and Country			Class II. Commercial Classes. Towns.			Class III. Labouring Classes. Country			Class IV. Artisans. Towns		
	No. Obs.	Average Weight. Pounds	Increase. Pounds	No. Obs.	Average Weight. Pounds.	Increase. Pounds.	No. Obs.	Average Weight. Pounds	Increase. Pounds.	No. Obs.	Average Weight. Pounds.	Increase. Pounds.	No. Obs.	Average Weight. Pounds.	Increase. Pounds.
Birth	451	7·1	—	—	—	—	—	—	—	—	—	—	451	7·1	—
0–1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1–	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2–	2	32·5	—	—	—	—	—	—	—	2	32·5	—	—	—	—
3–	41	34·0	1·5	—	—	—	—	—	—	11	33·1	—	30	35·0	—
4–	102	37·3	3·3	—	—	—	1	37·5	—	15	35·8	2·7	86	38·6	3·6
5–	193	39·9	2·6	—	—	—	—	—	—	29	38·9	3·1	164	40·9	2·3
6–	224	44·4	4·5	—	—	—	—	—	—	35	44·2	5·3	189	44·6	3·7
7–	246	49·7	5·3	—	—	—	4	51·3	3·8	37	47·2	3·0	205	50·7	6·1
8–	820	54·9	5·2	—	—	—	63	55·5	4·2	286	54·8	7·6	471	54·3	3·6
9–	1425	60·4	5·5	—	—	—	211	62·3	6·8	415	60·5	5·7	799	58·3	4·0
10–	1464	67·5	7·1	92	74·0	—	370	65·2	2·9	721	67·0	6·5	281	64·0	5·7
11–	1599	72·0	4·5	185	78·7	4·7	686	68·0	2·8	553	72·2	5·2	175	69·0	5·0
12–	1786	76·7	4·7	369	84·9	6·2	905	73·2	5·2	366	75·9	3·7	146	73·0	4·0
13–	2443	82·6	5·9	621	91·6	6·7	854	80·1	6·9	328	79·7	3·8	640	79·0	6·0
14–	2952	92·0	9·4	748	102·2	10·6	799	89·5	9·4	9	89·2	9·5	1396	87·3	8·3
15–	3118	102·7	10·7	652	114·3	12·1	344	99·4	9·9	676	100·6	11·4	1446	96·4	9·1
16–	2232	119·0	16·3	834	129·5	15·2	55	117·2	17·8	169	117·2	16·6	1177	112·2	15·8
17–	2496	130·9	11·9	1705	141·7	12·2	38	128·8	11·6	80	131·5	14·3	673	121·5	9·3
18–	2150	137·4	6·5	1638	146·4	4·7	39	135·1	6·3	135	138·7	7·2	338	129·3	7·8
19–	1438	139·6	2·2	940	148·5	2·1	69	138·6	3·5	140	140·2	1·5	289	131·1	1·8
20–	851	143·3	3·7	451	152·4	3·9	52	140·1	1·5	175	144·3	4·1	173	136·4	5·3
21–	738	145·2	1·9	365	152·7	·3	52	143·9	3·8	164	147·8	3·5	157	136·2	—
22–	542	146·9	1·7	215	152·8	·1	51	145·5	1·6	167	150·6	2·8	109	138·6	2·2
23–	551	147·8	·9	112	151·5	—	57	146·8	1·3	279	152·8	2·2	103	140·2	1·6
24–	483	148·0	·2	56	149·6	—	57	147·1	·3	250	151·9	—	120	143·4	3·2
25–							45	148·5	1·4	224	154·1	1·3	61	139·9	—
26–							46	154·1	5·6	192	154·1	—	58	142·2	—
27–	1523	152·3	4·3	115	156·3	3·5	26	149·2	—	171	156·7	2·6	56	146·9	3·5
28–							33	156·1	2·0	213	155·1	—	50	148·0	1·1
29–							26	154·3	—	161	158·0	1·3	46	148·1	·1
30–35	964	159·8	7·5	24	171·5	15·2	87	158·5	2·4	700	159·2	1·2	153	150·1	2·0
35–40	840	164·3	4·5	24	173·5	—	80	166·6	8·1	631	160·5	1·3	105	156·5	6·4
40–50	1140	163·3	—	44	172·5	1·0	72	168·6	2·0	911	162·0	1·5	113	151·7	—
50–60	179	166·1	1·8	13	174·5	2·0	16	173·4	4·8	129	170·9	8·9	21	145·6	—
60–70	35	158·1	2·0	5	164·5	—	3	165·7	—	24	170·9	—	3	150·8	—
70–	12	182·1	—	—	—	—	1	189·0	—	11	175·3	4·4	—	—	—
Total Obs.	33043	—	—	9208	—	—	5142	—	—	8409	—	—	10284	—	—

TABLE XIX.—Showing the Average WEIGHT (including clothes), at all Ages, of different Classes of the Population of Great Britain.

Females.

Age last Birthday	General Population. All Classes. Town and Country			Class I. Professional Classes. Town and Country			Class II. Commercial Classes. Towns only			Class III. Labouring Classes. Country only			Class IV. Artisan Classes. Towns only		
	No. Obs.	Average Weight. Pounds	Increase. Pounds	No. Obs.	Average Weight. Pounds	Increase. Pounds	No. Obs.	Average Weight. Pounds	Increase. Pounds	No. Obs.	Average Weight. Pounds	Increase. Pounds	No. Obs.	Average Weight. Pounds	Increase. Pounds
Birth	466	6·9	—	—	—	—	—	—	—	—	—	—	466	6·9	—
0–	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1–	8	20·1	—	—	—	—	1	22·5	—	—	—	—	7	19 6	12·7
2–	9	25·3	5·2	—	—	—	—	—	—	—	—	—	9	25·3	5·7
3–	30	31·6	6·3	—	—	—	11	30·9	—	8	33·0	—	22	30·8	5·5
4–	97	36·1	4·5	—	—	—	12	37·9	7·9	17	34·6	1·6	68	35·8	5·0
5–	160	39·2	3·1	—	—	—	18	38·8	0·9	44	38·4	3·8	108	40·3	4·5
6–	178	41·7	2·5	—	—	—	13	41·4	2·6	43	40·5	2·1	122	43·1	2·8
7–	148	47·5	5·8	7	51·8	—	31	45·4	4·0	42	46·8	6·3	99	46·2	3·1
8–	330	52·1	4·6	6	52·5	·7	12	52·5	7·1	140	51·9	5·1	172	51·8	5·6
9–	535	55·5	3·4	17	55·4	2·9	23	55·0	2·5	209	56·5	4·6	286	55·2	3 4
10–	495	62·0	6·5	37	62·9	7·5	23	62·9	7·9	171	61·8	5·3	264	60·5	5·3
11–	456	68·1	6·1	61	69·9	7·0	41	68·5	5·6	130	67·1	5·3	224	66·8	6·3
12–	419	76·4	8·3	55	79·7	9·8	55	77·3	8·8	126	75·7	8 6	183	74·9	8·1
13–	209	87·2	10·8	63	89·8	10·1	60	88 2	10·9	21	84·0	8·3	65	84·9	10·0
14–	229	96·7	9·5	75	98·8	9·0	81	96·3	8·1	12	94·0	10·0	61	97·7	12 8
15–	187	106·3	9·6	60	107·3	8·5	91	104·1	7·8	—	—	—	36	107·6	9·9
16–	128	113·1	6·8	49	113·9	6·6	75	112·2	8·1	—	—	—	—	—	—
17–	74	115·5	2·4	14	116·8	2·9	59	114·3	2·1	—	—	—	—	—	—
18–	64	121·1	5·6	26	123·1	6·3	38	119·1	4·8	—	—	—	—	—	—
19–	97	123·8	2·7	47	125·5	2·4	50	122·1	3·0	—	—	—	—	—	—
20–	128	123·4	·6	58	126·6	1·1	70	120·3	—	—	—	—	—	—	—
21–	59	121·8	—	23	125·3	—	36	118·3	—	—	—	—	—	—	—
22–	53	123·4	—	14	122·8	—	37	124·1	2·0	—	—	—	—	—	—
23–	29	124·1	·7	12	128·7	2·1	16	119·4	—	—	—	—	—	—	—
24–	19	120·8	—	5	120·5	—	—	—	—	—	—	—	—	—	—
25–30	43	120·0	—	19	119·1	—	—	—	—	—	—	—	—	—	—
30–35 35–40	23	120·8	—	8	120·6	—	—	—	—	—	—	—	—	—	—
40–45	9	118	—	—	—	—	—	—	—	—	—	—	—	—	—
45–50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50–60	3	104	—	—	—	—	—	—	—	—	—	—	—	—	—
60–70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
70–	3	106·0	—	—	—	—	—	—	—	—	—	—	—	—	—
Total Obs.	4685	—	—	656	—	—	853	—	—	963	—	—	2192	—	—

TABLE XX.—Summary Table showing the average STATURE, WEIGHT, and their relation

Age last birth-day	Height without shoes, in inches		Weight with clothes, in lbs.		Chest-girth, empty, in inches		Strength: drawing-power, in lbs.		Span of arms across the back, in inches		Ratio: weight divided by height		Ratio: weight divided by chest-girth	
	M.	F.	M.	F.	M.	F.	M.	F	M.	F.	M.	F.	M.	F.
Birth	19·52	19·31	7·1	6·9	13·25	12·65	—	—	—	—	—	—	—	—
0–1	27·00	24·83	—	—	—	—	—	—	—	—	—	—	—	—
1–2	33·50	27·50	—	—	—	—	—	—	—	—	—	—	—	—
2–	33 70	32·33	32·5	—	—	—	—	—	—	—	·96	—	—	—
3–	36·82	36·05	34·0	31·9	—	—	—	—	—	—	·92	0·87	—	—
4–	38·46	38·13	37·3	35·5	—	—	—	—	—	—	·99	·93	—	—
5–	41·03	40·82	39·9	39·6	—	—	—	—	—	—	·97	·97	—	—
6–	44 00	42·63	44·4	42·4	—	—	—	—	—	—	1·01	1·00	—	—
7–	45·97	44·45	49·7	46·7	—	—	—	—	43·10	45·83	1·08	1·05	—	—
8–	47·05	46·60	54·9	52·2	—	—	—	17·5	47·56	46·50	1·16	1·12	—	—
9–	49·70	48·73	60·4	55·5	—	—	—	15·0	49·07	48·39	1·22	1·14	—	—
10–	51·84	51·05	67·5	62·0	26·10	—	—	15·1	50·64	49·92	1·30	1·21	2·59	—
11–	53·50	53·10	72·0	68·1	26·53	—	37·5	17·6	51·98	52·41	1·35	1·28	2·72	—
12–	54·99	55·66	76·7	76·4	27·20	—	38·7	18·8	54·03	55·04	1·39	1·37	2·82	—
13–	56·91	57·77	82·6	87·0	28·03	—	44·2	22·3	55·51	58·06	1·45	1·51	2·95	—
14–	59·33	59·80	92·0	96·7	28·46	—	47·0	25·5	57·15	59·04	1·55	1·62	3·23	—
15–	62·24	60·93	102 7	104·8	29·74	—	52·2	29·6	—	60·79	1·65	1·72	3·46	—
16–	64·31	61·75	119·0	112·7	31·53	—	58·2	31·8	—	61·66	1·85	1·82	3·78	—
17–	66·24	62·52	130·9	114·9	33·64	—	67·8	33·9	—	62·52	1 98	1·84	3 89	—
18–	66·96	62·44	137·4	117·7	34·19	—	74·2	38·9	—	62·50	2·05	1·89	4·02	—
19–	67·29	62·75	139·6	123·7	34·49	—	76·4	40·8	—	62·69	2·07	1·97	4·05	—
20–	67·52	62·98	143·3	123·2	34·98	—	77·9	42·0	—	62·49	2·12	1·96	4·09	—
21–	67·63	63·03	145·2	121·2	35·25	—	80·2	41 9	—	62·19	2·15	1·92	4·13	—
22–	67·68	62·87	146·9	124·2	35·33	—	81·7	42·9	—	62·35	2·17	1·97	4·16	—
23–	67·48	63·01	147·8	126·4	35·62	—	79·7	38·5	—	62·36	2·19	2·06	4·15	—
24–	67·72	62·70	148·0	120·6	35·82	—	80·9	39·2	—	62·22	2·19	1·92	4·13	—
25–	67·75		149·2								2·20			
26–	67·78		151·7								2·23			
27–	67·92	62·02	152·3	120·1	36·18	—	83·5	40·8	—	62·61	2·39	1·94	4·21	—
28–	67·70		153·9								2·27			
29–	67·87		154·2								2·27			
30–	67·89		159·8								2·35			
35–	68·09		164·3	121·0	37·08	—	77·5	46·2	—	62·10	2·41		4·37	—
40–	67·96		163·1	118·6							2·39			
50–	67·92	61·15	166·1	—	37·38	—	76·5				2·44	1·96	4·38	—
60–	67·41		158·1	—	—	—	74·6	38·1	—	60·29	·24			
70–	*69·22*		182·1	—	—	—	—				2·62			

CHEST-GIRTH, STRENGTH, and SPAN OF ARMS of both Sexes and of all Ages, to each other.

Ratio: weight divided by strength		Relation of span of arms to height		Difference between the two sexes: females compared with males								Age last Birth-day
				Height		Weight		Strength		Span of arms		
M.	F.	M.	F.	Actual	Per cent.	Actual	Per cent.	Actual	Per cent.	Actual	Per cent.	
				inches		lbs.						
—	—	—	—	−0·21	−1·07	− 0·2	− 2·81	—	—	—	—	Birth
—	—	—	—	—	—	—	—	—	—	—	—	0–1
—	—	—	—	—	—	—	—	—	—	—	—	1–2
—	—	—	—	—	—	—	—	—	—	—	—	2–
—	—	—	—	−0·77	−2·09	− 2·1	− 6·17	—	—	—	—	3–
—	—	—	—	−0·33	−0·86	− 1·8	− 4·82	—	—	—	—	4–
—	—	—	—	−0·21	−0·51	− 0·3	− 0·75	—	—	—	—	5–
—	—	—	—	−1·37	−3·11	− 2·0	− 4·50	—	—	—	—	6–
—	—	−2·87	+1·38	−1·52	−3·30	− 3·0	− 6·04	—	—	+2·7	+6·2	7–
—	2·98	+ ·51	− ·10	−0·45	−0·99	− 2·7	− 4·92	—	—	−1·0	−2·1	8–
—	3·70	− ·63	− ·34	−0·97	−1·95	− 4·9	− 8·11	—	—	−0·6	−1·2	9–
—	4·11	−1·20	−1·13	−0·79	−1·52	− 5·5	− 8·15	—	—	−0·7	−1·3	10–
·92	3·87	−1·52	− ·69	−0·40	−0·74	− 3·9	− 5·41	−19·9	−53·0	+0·4	−0·7	11–
·98	4·06	− ·96	− ·62	+0·67	+1·22	− 0·3	− 0·39	−19·9	−51·4	+1·0	+1·8	12–
·87	3·90	−1·40	+ ·29	+0·86	+1·51	+ 4·4	+ 5·82	−21·9	−49·5	+2·5	+4·5	13–
·96	3·79	−2·18	− ·76	+0·47	+0·79	+ 4·7	+ 5·11	−21·5	−45·7	+1·9	+3·3	14–
·97	3·54	—	− ·14	−1·31	−2·10	+ 2·1	+ 2·04	−22·6	−43·3	—	—	15–
·04	3·54	—	− ·09	−2·56	−4·00	− 6·3	− 5·30	−26·4	−45·3	—	—	16–
·93	3·46	—	—	−3·72	−5·61	−16·	−12·21	−39·	−50·0	—	—	17–
·85	3·03	—	+ ·06	−4·52	−6·75	−19·7	−14·34	−35·3	−47·5	—	—	18–
·83	3·03	—	− ·06	−4·54	−6·74	−15·9	−11·39	−35·6	−46·6	—	—	19–
·84	2·93	—	− ·49	−4·54	−6·72	−20·1	−14·02	−35·9	−46·0	—	—	20–
·81	2·89	—	− ·84	−4·60	−6·30	−24·0	−16·53	−38·3	−47·7	—	—	21–
·80	2·89	—	− ·52	−4·81	−7·10	−22·7	−15·45	−38·8	−47·2	—	—	22–
·85	3·28	—	− ·65	−4·41	−6·63	−21·4	−14·49	−41·2	−51·7	—	—	23–
·83	3·08	—	− ·48	−5·02	−7·41	−27·4	−18·51	−41·7	−50·1	—	—	24–
												25–
												26–
·82	2·94	—	− ·41	−5·82	−8·50	−38·	−24·97	−42·7	−51·0	—	—	27–
												28–
												29–
·09	2·61	—	—	—	—	−41·0	−25·31	−31·3	−40·4	—	—	30–
·13		—	+ ·05	−6·93	10·18							35–
·23	3·11	—	—	—	—	−44·5	−27·34	−37·4	−50·0	—	—	40–
—		—	—	—	—	—	—	—	—	—	—	50–
—		—	—	—	—	—	—	—	—	—	—	60–
—		—	—	—	—	—	—	—	—	—	—	70–

has stated that man attains his maximum height at the age of 30 ye and maintains it up to 50 years, after which it begins to recede, anc 90 it has lost three inches. This may be, and probably is, true of inc duals if measured from year to year, but it does not appear to be tru the population in the aggregate. The loss of stature resulting from degeneration and loss of tissue, and the stooping position assumed old people, is more than counterbalanced by the survival of a gre number of individuals who are above the average in height. uniform increase in the weight and chest-girth throughout adult life confirms this view.

Industrial Schools.

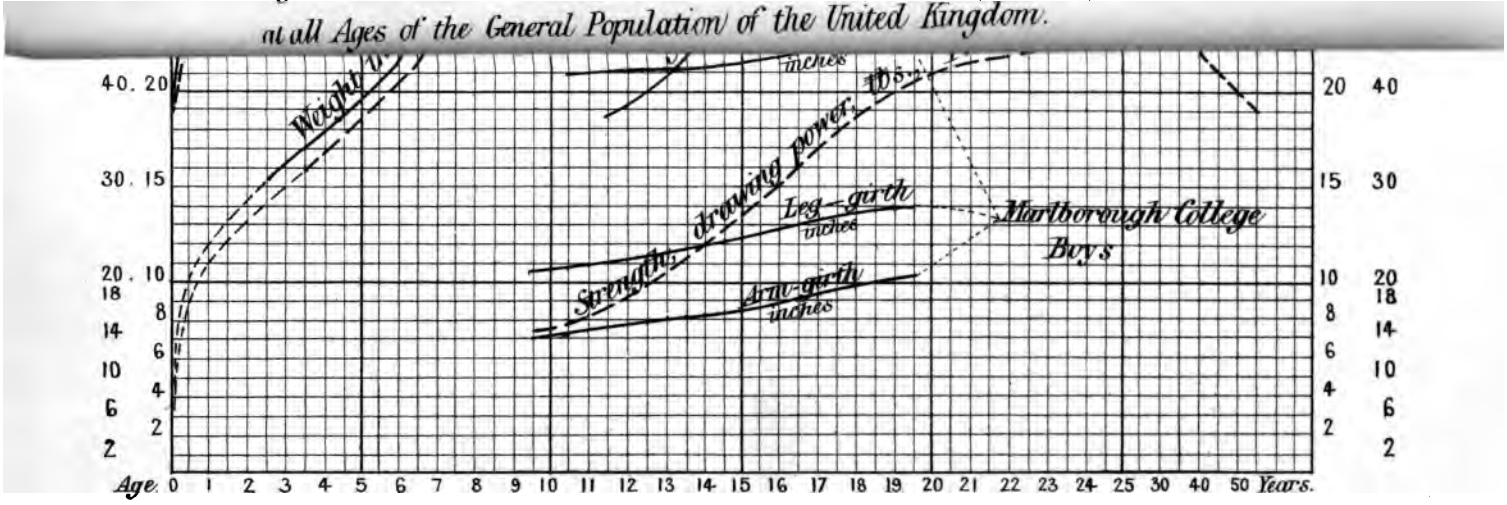
64. The statistics referring to Industrial School children of both s are given in a separate form, as illustrating the physique of children l under the most unfavourable conditions of life. Boys of this class of age of 14 years are nearly seven inches (6·83) shorter of stature and lbs. lighter in weight than the 1st or Standard Class of the foreg tables. The returns sent in by Mr. R. Sutton from the Swinton Sch near Manchester, are the most complete in all their details which the C mittee has received from any source, and they may be accepted as mo of what such returns ought to be.

TABLE XXI.—Comparative Table of Boys and Girls in Industrial Sch

Age	Number of Observations		Height		Weight		Chest-girth		Span of A	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	
			inches	inches	lbs.	lbs.	inches	inches	inches	in
16–	7	—	57·64	—	93·92	—	29·25	—	57·50	
15–	58	1	55·43	55·50	85·50	67·50	28·30	—	57·17	5
14–	102	33	54·46	55·00	77·35	81·25	27·29	—	54·72	5
13–	221	58	53·23	52·98	72·31	72·76	26·31	—	52·45	5
12–	205	66	51·79	51·16	67·40	68·25	25·85	—	50·10	5
11–	158	63	49·11	51·48	63·19	60·96	24·17	—	49·15	4
10–	191	60	48·09	47·70	56·76	56·00	23·97	—	47·46	4
9–	100	70	47·02	46·44	52·40	52·77	23·30	—	45·30	4
8–	69	66	44·61	44·68	47·13	47·79	22·58	—	43·20	4
7–	64	45	43·54	42·38	45·70	44·05	22·16	—	41·23	4
6–	46	47	41·14	41·15	40·43	40·66	21·95	—	40·30	3
5–	37	43	38·63	39·22	36 68	36·98	21·42	—	38·10	3
4–	9	19	36·27	37·07	33 61	34·09	20·50	—	35·00	3
3–	5	10	34·50	35·50	30·50	32·50	—	—	33·25	3
2–	—	11	—	31·95	—	26·77	—	—	—	2
1–	—	4	—	27·00	—	16·21	—	—	—	
6 & under 12 months	—	4	—	26·25	—	16·66	—	—	—	
0 & under 6 months	1	1	23·50	27·50	11·00	12·50	—	—	—	
Total	1,273	601								

53rd Report Brit. Assoc. 1883.

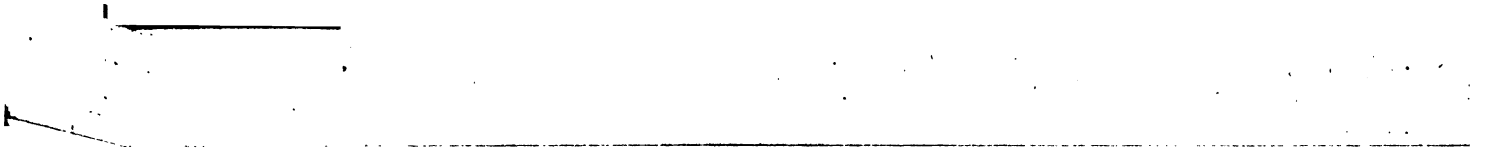
Diagram showing the Stature, Weight, Chest girth and Strength of both Sexes, at all Ages of the General Population of the United Kingdom.



Illustrating the Report of the Anthropometric Committee.

C. Roberts.

Stettiswoode & Co 13th London



Girls, of English Parentage, in Industrial and Workhouse Schools, at each age.

Ages last birthday	Boys								Girls							
	Number of observations	Eyes light, with			Eyes dark, with			Eyes light brown, with light or dark hair	Number of observations	Eyes light, with			Eyes dark, with			Eyes light brown and green, with light or dark hair
		Light hair	Dark hair	Red hair	Dark hair	Fair hair	Red hair			Light hair	Dark hair	Red hair	Dark hair	Fair hair	Red hair	
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
16	7	43·0	29·0	—	29·0	—	—	—	1	—	—	—	—	—	—	—
15	61	37·7	29·5	5·0	24·6	—	1·6	1·6	9	55·6	11·1	11·1	11·1	—	—	11·1
14	89	49·6	18·0	2·2	25·8	1·1	1·1	2·2	46	54·2	4·4	8·8	17·4	6·5	2·2	6·5
13	182	49·0	10·0	4·4	28·6	0·5	3·7	3·8	67	41·3	1·6	13·4	35·6	—	1·6	6·0
12	165	47·3	16·0	3·0	20·4	1·8	2·2	7·3	64	48·4	7·8	7·8	28·1	—	6·3	1·6
11	134	47·0	10·5	6·7	24·6	4·5	1·5	5·2	76	56·6	5·2	6·6	14·5	4·0	7·9	5·2
10	168	50·0	14·3	2·4	27·4	—	3·5	2·4	66	63·7	2·5	2·5	25·8	—	—	4·5
9	85	54·1	4·7	1·2	34·1	1·2	4·7	—	69	60·9	2·9	2·9	29·0	1·4	2·9	—
8	57	49·1	3·5	12·3	24·5	1·8	3·5	5·3	57	60·0	1·7	1·7	31·1	3·3	—	7.0
7	48	54·2	8·3	2·1	33·3	—	—	2·1	37	64·9	5·4	5·4	16·2	8·1	—	—
6	31	58·1	6·4	3·2	25·0	—	—	6·4	30	80·0	3·3	—	6·7	6·7	—	3·3
5	31	58·1	6·4	—	32·3	3·2	—	—	24	46·0	12·3	—	33·4	8·3	—	—
4	9	44·4	—	—	44·4	1	—	—	7	42·7	—	—	42·9	—	—	14·2
3	5	60·0	—	—	40·0	—	—	—	4	50·0	—	—	50·0	—	—	—
2	—	—	—	—	—	—	—	—	3	66·0	—	—	34·0	—	—	—
Total	1,072	49·5	12·1	3·8	26·8	1·6	2·4	3·8	560	56·5	4·3	5·1	25·8	2·7	2·9	2·7

TABLE XXIII.—Comparison of Boys and Girls, at different Ages, in Industrial School at Swinton, near Manchester.

Age	No. of Observations		Height		Weight		Chest-girth		Breathing capacity		Strength of arm. Drawing power		Sight. Test dots distinguished at distance of feet	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
			inches	inches	lbs.	lbs.	inches	inches	cubic inches		lbs.	lbs.	ft. in.	ft. in.
14	6	21	55·0	54·4	78·7	80·9	28·3	29·0	189	177	40·0	33·0	27·9	38·1
13	28	27	52·5	51.1	70·0	71·3	26·6	27·3	166	143	37·3	27·6	30·9	37·2
12	41	29	54·0	49·9	65·4	64·6	25·9	27·6	166	138	36·0	27·6	32·6	36·7
11	22	31	50·0	49·4	63·1	60·3	25·3	27·5	153	145	34·2	25·4	32·3	39·0
10	32	27	48·2	47·0	57·1	55·4	23·6	26·9	140	124	26·7	19·5	28·4	34·8
9	32	25	46·7	45·8	52·7	52·0	23·0	26·2	132	126	21·7	18·0	24·2	31·7
8	24	28	43·8	44·4	47·0	47·3	22·6	25·7	117	112	18·4	17·0	22·8	36·5
7	32	20	43·6	41·2	46·2	42·4	22·2	25·5	77	83	18·5	12·5	23·8	27·6
6	28	19	40·7	39·0	39·9	37·2	21·4	21·0	48	54	11·5	8·5	19·8	34·3
5	12	15	38·9	38·6	35·8	34·8	20·8	20·6	38	41	6·4	6·8	16·4	19·9
4	3	3	35·0	35·0	32·3	29·7	20·0	19·3	22	30	4·0	4·3	9·6	13·0
3	1	—	34·6	—	28·0	—	20·0	—	20	—	—	—	—	—
Total	261	245	—	—	—	—	—	—	—	—	—	—	—	—

Colour of Eyes and Hair. Percentage proportion in each Class.

		Eyes light, with			Eyes dark, with			Light brown, green, or exceptional eyes, with light or dark hair	Total
		Hair light	Hair dark	Hair red	Hair dark	Hair fair	Hair red		
Boys 261	English	54·6	12·7	1·7	20·1	1·2	3·4	6·3	100
	Irish	65·0	3·7	3·1	15·3	5·5	7	6·7	100
Girls 245	English	39·8	26·1	3·4	20·5	—	1·1	9·1	100
	Irish	50·0	18·3	6·1	23·2	—	1·2	1·2	100

Physical Improvement or Degeneracy of the Population.

65. Few statistics are in existence which help to throw light on this subject. It is generally believed that the population in the manufacturing towns of the North of England is rapidly degenerating, but a comparison of the measurements of stature and weight given in the Report of the Factory Commissioners of 1833, and in the Report to the Local Government Board on 'Changes in Hours and Ages of Employment of Children and Young Persons in Textile Factories,' 1873, shows that this is not the case. On the contrary, an examination of Table XXIV., showing these measurements, indicates a slight but uniform increase in stature, and a very large increase in weight, at corresponding ages. The increase in weight amounts to a whole year's gain, and a child of 9 years of age in 1873 weighed as much as one of 10 years in 1833, one of 10 as much as one of 11, and one of 11 as much as one of 12 years in the two periods respectively.

66. As an example of the condition of a class living under most favourable conditions, a table (XXV.) showing the measurements of the boys in the Friends' (Quakers') School at York, extending over a period of

twenty-seven years, is given. Allowing for one or two obvious errors of observation, the general run of the figures is very uniform, the statures remaining stationary, while there is a slight improvement in the weight at the higher ages in the last nine years.

TABLE XXIV.—Showing the average STATURE and WEIGHT of Factory Children at an interval of 40 years, 1833–1873. (Stanway and Roberts.)

STATURE.

Age	Boys				Girls			
	1833		1873		1833		1873	
	No.	Inches	No.	Inches	No.	Inches	No.	Inches
9	17	48·14	126	48·30	30	47·97	144	48·31
10	48	49·79	256	49·85	41	49·62	201	50·33
11	53	51·26	196	51·59	51	51·15	174	51·21
12	42	53 38	175	53·30	80	53·70	—	—
			WEIGHT.					
	No.	lbs.	No.	lbs.	No.	lbs.	No.	lbs.
9	17	51 76	136	58 15	30	51·31	137	55·87
10	48	57·00	247	60·19	41	54·80	179	60·59
11	53	61·84	189	67·72	63	59·69	180	65·37
12	42	65·97	167	69·76	80	66·08	—	—

TABLE XXV.—Showing the average STATURE and WEIGHT of Boys in the York Friends' School, for 27 years, 1853–1879.

Age last Birth-day	No. of Obs.	STATURE				WEIGHT			
		27 yrs. 1853 to 1879	9 yrs. 1853 to 1861	9 yrs. 1862 to 1870	9 yrs. 1871 to 1879	27 yrs. 1853 to 1879	9 yrs. 1853 to 1861	9 yrs. 1862 to 1870	9 yrs. 1871 to 1879
		inches	inches	inches	inches	lbs.	lbs.	lbs.	lbs.
9–	13	51·5	51·4	49·7	53·4	62·9	63·2	*54·2	70·3
10–	86	53·3	53·9	*51·6	54·7	68·5	71·6	*61·1	74·2
11–	261	56·4	56·5	56·1	56 5	79·7	80·3	76·1	81·2
12–	585	57·7	58·0	57·9	57·4	85·8	86·2	86·1	85·4
13–	874	59·9	60·6	59·9	59·6	95·1	96·9	95·0	95·0
14–	1117	62·1	62·1	62·3	61·9	106·0	105·8	107·0	105·4
15–	1174	64·2	63·9	64·3	64·2	116·6	113·5	117·2	117·2
16–	515	66·1	65·4	66·1	66·3	127·8	122·2	126·6	130·2
1 –	36	67·2	—	67·0	67·4	136·3	—	130 0	138·6
	4661								

* These values are too low, due probably to some error of observation. Mr. R. Clark, who furnishes the returns, is unable to account for the discrepancies in these year

Conclusion.

67. Attention has been called to some of the principal points of interest in the data collected by the Committee, but in many respects the tables have been left to speak for themselves; and it is not improbable that a study of them will lead some persons to conclusions differing more or less from those given in this Report.[1]

68. The original returns, which the Committee recommend may be placed in the charge of the Anthropological Institute for preservation and future examination, comprise many statistics which could not be introduced into this Report on account of the time and labour required for their analysis and tabulation.

69. The Committee believes that it has laid a substantial foundation for a further and more exhaustive study of the physical condition of a people by anthropometric methods, and that its action will prove it has been useful as an example to other scientific societies and to individuals in stimulating them, as well as directing them, in the methods of making statistical inquiries relative to social questions. The medical officers, managers, or superintendents of many colleges, schools, and charitable institutions have been induced to keep registers of the physical proportions of those under their charge, which will in a few years become valuable records, not only of the physical condition of the inmates of their institutions, but of the sanitary conditions under which they have lived; they will also be available for the further study of the subjects specially treated of in this Report. The Collective Investigation Committee of the British Medical Association propose to carry on the work of this Committee in a direction which it is most needed, namely, by issuing an album in which persons may methodically record at frequent intervals their height, weight, and other physical qualities, together with points in their personal and medical history. The Committee hopes that this habit will be largely adopted and encouraged by the members of the British Association.

70. The Committee has to express its thanks to the numerous contributors to their store of facts, whose names and contributions have been published from time to time in their interim reports, and to numerous friends who, although not contributors themselves, have induced others to give their assistance.

[1] The inquiries relative to *breathing capacity* were abandoned in 1879 on account of the unsatisfactory nature of the returns received previous to that year. The apparatus were faulty.

The statistics relating to *eyesight* were dealt with in the Report for 1881, and the returns since received are not sufficient to require a further discussion of the subject.

The subject of *colour-blindness* was taken up by a Special Committee of the Ophthalmological Society after it had been inaugurated by this Committee, and it was given up on that account. The very interesting report of the Special Committee is published in the first volume of the *Trans. of the Ophthal. Soc.* 1881.

APPENDIX A.

Specimen of the cards used by the committee for collecting observations, and the instructions for filling them up. The cards are of different colours for the two sexes, and one corner is cut off to make them face one way when arranged by hand. They can be dealt out like playing cards, and much time and trouble is saved in the analysis of their records.

ANTHROPOMETRIC COMMITTEE OF THE BRITISH ASSOCIATION,
22 Albemarle Street, London
(to which address this Card is to be returned after being filled).

Height is to be taken as without shoes, and *weight in* ordinary indoor costume.
Span of Arms is the distance between the tips of the middle fingers extended horizontally, measured across the back (*i.e.* back to the wall).
Colour of Eyes should be stated as grey, light blue, blue, dark blue, light brown, brown, dark brown, green, or black.
Colour of Hair as very fair, fair, golden, red, red brown, light brown, brown, dark brown, black brown, or black.
For *chest-girth*, *breathing capacity*, *strength*, *colour-blindness*, and *eyesight*, see the paper of instructions.
Under *Place of Birth* state Parish and County; or, if abroad, the name of the Country.
Under *Occupation* state rank or profession.
Race should be stated as English, pure English, very pure English, Irish, pure Irish, very pure Irish, Scotch, pure Scotch, very pure Scotch, or mixed Scotch and English, &c.
Origin, as countryfolk, pure countryfolk, very pure countryfolk, townfolk, pure townfolk, or very pure townfolk, country birth, T. since boy, &c.

FOR A SINGLE SET OF OBSERVATIONS.

Place _____ Date _____ 188___
Name (or Initials) _____ Sex _____
Age—years _____ months _____
Height, without shoes, inches & eighths Span of arms, inches & eighths _____
Weight, in ordinary indoor costume, lbs. _____ Strength, drawing power, lbs. _____
Chest-girth, inches and eighths _____ Breathing capacity, cub. in. _____
Colour of Eyes _____ Colour of Hair _____
Sight { Test dots distinguished at, feet _____ Colour-blindness _____
Test-types No. 1, read at inches
„ No. 10, „ feet Astigmatism _____
Place of Birth { _____ } *Occupation* _____
Race _____ *Origin* _____
Name and Address of Observer _____

Girth of Chest.—This is the method adopted in the British Army. Make the person stand quite upright, with his shoulders back, and his arms hanging loosely by his side. The measurement must be taken next to the skin, without compressing it. The lower edge of the tape should touch the nipples, and the measurement should be read off in front. Care should be taken that the tape passes horizontally round the chest, because if the measurement is made obliquely, below the blade-bone, it will be erroneous. The person should be required to count ten slowly during the operation, to prevent him from keeping his lungs over-inflated. (If this measurement is made on females, it should be taken *below* the breasts.)

Strength of Arm.—It is proposed to measure the force that can be exerted by the arm when pulling (as an archer with a bow). A spring balance should be used for this purpose. The right or left arm, whichever is the strongest, should be used to draw, and the other to resist. The resisting arm must be free, and extended straight from the side, as nearly as possible in the line of the shoulders, and the hand of the other arm brought back towards the ear. (A spring balance, or 'arm-testing machine' for testing the drawing power, can be obtained of Herbert & Sons, 6 West Smithfield, London, E.C., price 18*s.* 6*d.*)

The above figure represents the position in which the strength of arm should be tested.

Appendix B.

Table XXVI., showing the Stature, Chest-girth, and Weight of Recruits, is introduced here for future reference and comparison. The figures show that recruits of the age of 18 years may be expected to *increase* 1 inch in stature, 1½ inch in chest-girth, and 10 lbs. in weight, *before* they reach the age of 23 years.

TABLE XXVI.—STATURE (barefoot) of Recruits for the Army, 1860–4.

Height ithout shoes. Inches	Age last Birthday								
	17	18	19	20	21	22	23	24	25
and upwards	2	19	55	52	52	46	49	59	120
71–	2	71	123	113	129	101	102	124	240
70–	8	205	259	280	276	261	199	253	527
69–	21	519	555	559	508	488	400	455	747
68–	67	1172	1139	988	835	756	609	746	1135
67–	219	2995	2159	1706	1268	1108	877	964	1425
66–	871	5593	3277	2292	1428	1309	964	1019	1349
65–	1224	5009	2504	1814	1144	881	608	567	996
64–	753	3968	1344	1172	718	603	373	421	850
63–	386	534	232	358	123	105	63	65	134
1 under 62	135	78	25	26	17	9	7	7	12
Total	3683	20,163	11,672	9360	6493	5667	4251	4680	7537
Mean	65·50	66·00	66·25	66·50	66·75	67·00	67·00	67·00	67·00

CHEST-GIRTH (empty) of Recruits for the Army Anthropometric Committee.

hest-girth, empty. Inches	Age last Birthday								
	17	18	19	20	21	22	23	24	25
43–	—	—	—	—	—	—	—	1	—
42–	—	—	—	—	—	—	—	—	—
41–	—	—	—	—	1	—	—	1	2
40–	—	—	—	—	—	—	—	1	2
39–	—	—	2	5	1	2	3	4	2
38–	—	3	4	9	9	8	9	13	5
37–	2	8	12	13	19	14	18	22	16
36–	—	37	70	51	46	32	24	45	31
35–	3	74	123	80	51	63	38	43	41
34–	10	155	173	123	79	39	53	47	44
33–	26	166	131	63	23	20	11	13	16
32–	9	55	37	14	1	4	2	1	3
31–	7	11	9	2	—	—	—	—	—
30–	2	5	—	1	—	—	—	—	1
29–	1	2	—	—	—	—	—	—	1
Total	60	516	561	361	230	182	138	191	164
Mean	33·5	34·0	34·5	34·75	35·0	35·5	35·5	35·5	35·5

WEIGHT (naked) of Recruits for the Army, 1860–4.

Weight hout clothes. lbs.	Age last Birthday								
	17	18	19	20	21	22	23	24	25
170–	4	39	69	101	116	145	160	177	180
160–	25	202	331	441	472	489	484	528	489
150–	75	871	1228	1396	1409	1369	1199	1317	1218
140–	338	3674	4055	3950	3411	3024	2537	2497	2290
130–	1345	9965	8881	7128	5073	3981	3153	2914	2590
120–	2724	18,196	11,765	7497	4391	3351	2206	2266	2132
110–	3494	13,912	5961	2937	1695	1191	761	757	751
100–	1404	2734	985	374	151	116	50	70	107
ler 100	146	282	50	19	5	2	1	1	3
Total	9555	49,875	33,325	23,843	16,723	13,672	10,559	10,527	9760
Mean	*120·0*	125·0	125·0	130·0	135·0	135·0	135·0	135·0	135·0

Appendix C.

Index to the Tables in the several Reports of the Committee, showing the nature of the measurements given in each Table.

In 1879.

Several selected classes; males at each age.	Stature, weight, and ratio of weight to height.
Christ's Hospital School; males at each age.	Stature, weight, chest-girth, and relation to one another, by Sir Rawson Rawson.
British Race in England and America, and Belgians; males and females, at each age.	Stature and weight, with diagrams, by C. Roberts.
Recruits, British and American armies, at each age.	Stature and weight, by C. Roberts.

In 1880.

Schoolboys of several classes, of age 11 to 12.	Stature, by C. Roberts.
Standard class; males of ages 10 to 50.	Stature, weight, chest-girth, and strength of arm, with diagram.
Standard class; males of ages 10 to 50.	Relation of the several measurements to one another.
Standard class; males of ages 10 to 50.	Mean annual growth.
Professional classes; males of ages 10 to 50	Colour of eyes and hair, with diagram.
Persons of town and country origin; males at each age.	Stature and weight.
American boys and girls.	Stature and annual growth, with diagrams, by Prof. Bowditch and Sir Rawson Rawson.
Factory children; boys and girls, 1833, 1871–3.	Stature and weight, by C. Roberts.
Marlborough College; males at each age.	Stature, weight, chest-girth, girth of head, arm, and leg, by the Rev. T. A. Preston, Sir Rawson Rawson and C. Roberts.
Telegraph messengers; youths at each age.	Weight, chest-girth, and lifting power, by G. C. Steet.

In 1881.

General population of United Kingdom; males at each age.	Increase in stature, weight, chest-girth, and strength of arm, with diagram.
General population of United Kingdom; males at each age.	Stature, weight, chest-girth, and strength of arm.
Population of different classes; males at each age.	Stature and weight.
Population of different classes; males from 25 to 50.	Relative stature.
Population of different classes; males at each age.	On calculation of deciles, quartiles and medians applied to range of stature, weight, and strength of arm, by F. Galton.
Population of different classes; males at different ages.	On army test of eyesight in each class, with diagram, by Inspector-Gen. Lawson.
Marlborough College; boys at each age.	On Snellen's tests for eyesight, near and distant vision, and colour-blindness, by the Rev. T. A. Preston and C. Roberts.

In 1883.

1. General population of each part of United Kingdom; adult males.	Stature, weight, chest-girth, and strength.
2. General population; adult males and females.	Relative stature, weight and strength.
3. Population of counties; adult males.	Stature, weight, and complexion, with diagram and five maps.
4. Population of counties; adult males.	Stature: ratio per 1,000.
5. Population of several countries, Europe and America; adult males.	Stature: average, medium, and extreme.
6. Population of several races and nationalities; adult males.	Stature.
7. Selected classes (British); adult males.	Stature and weight.
8. Criminals and lunatics (British) compared with other classes; adult males.	Stature and weight.
9. Criminals and lunatics (British) compared with other classes; adult males.	Complexion: colour of eyes and hair.
10. Population of counties of United Kingdom; adult males.	Complexion: degree of nigrescence.
11. Population of English and Welsh origin; males and females at each age.	Complexion.
12. Classification of population according to media.	Nurture, occupations, and sanitary surroundings.
13. Schoolboys of several classes, of age 11 to 12.	Stature (same Table as in 1880).
14. Population of several classes; males from 25 to 30.	Relative stature (same Table as in 1881).
15. Infants (at birth); males and females	Height, length, and weight.
16. Population of several classes; males at each age.	Stature.
17. Population of several classes; females at each age.	Stature.
18. Population of several classes; males at each age.	Weight.
19. Population of several classes; females at each age.	Weight.
20. General population; males and females at each age.	Stature, weight, chest-girth, strength, and span of arm; relation to each other, and between the sexes.
21. Industrial Schools; males and females at each age.	Stature, weight, chest-girth, and span of arms.
22. Industrial Schools; males and females at each age.	Complexion.
23. Swinton Industrial School; males and females at each age.	Stature, weight, chest-girth, breathing capacity, strength of arm, sight, and complexion.
24. Factory children, 1833–73; males and females at each age.	Stature and weight.
25. York Friends' School, 1853–79; males at each age.	Stature and weight.
26. Recruits (British army), 1860–64; ages 17 to 25.	Stature, weight, and chest-girth.

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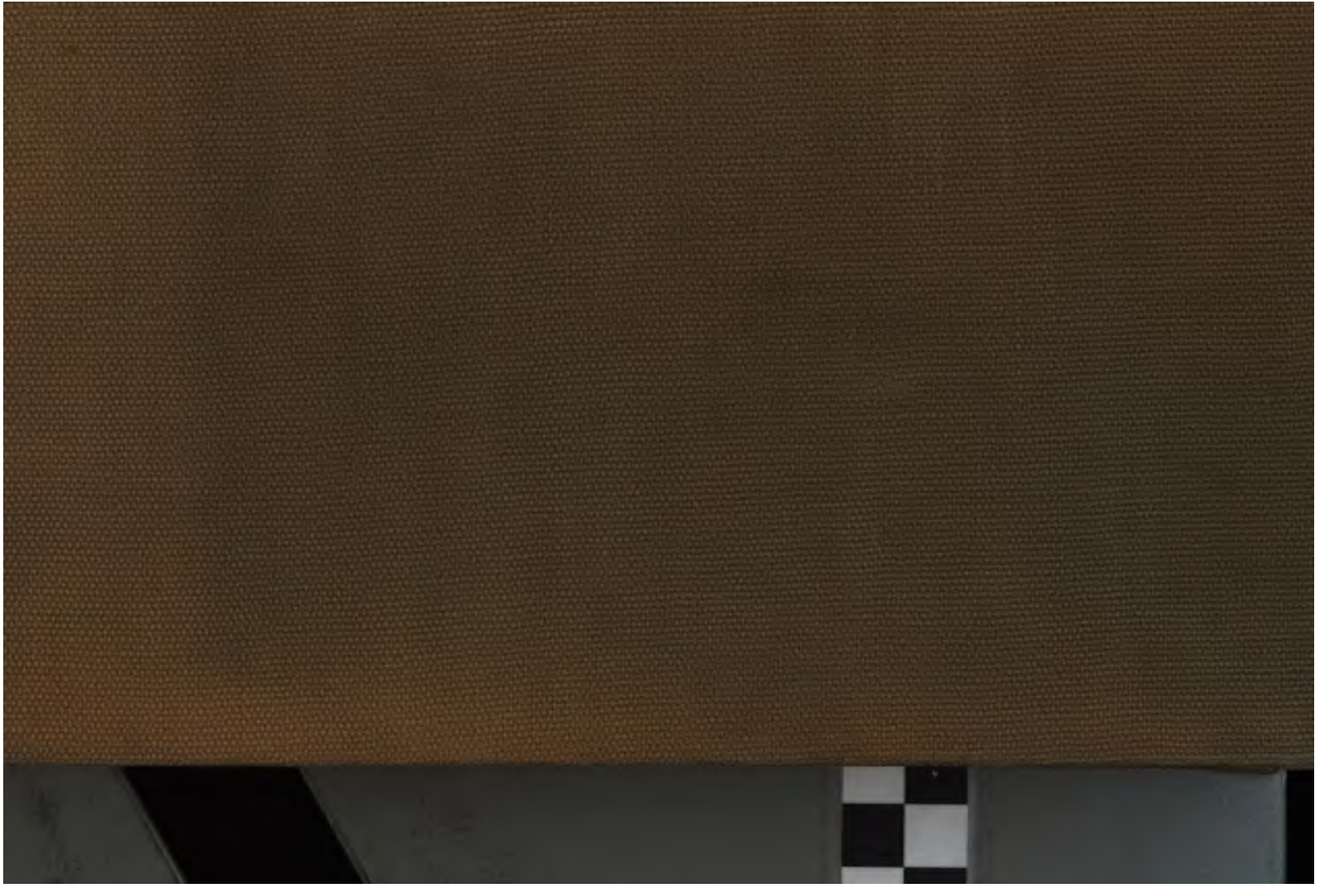
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